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THE MICROSCOPE

AND ITS RELATION TO

Medicine and Pharmacy.

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Vol. I.

DETROIT!

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THE MICROSCOPE.

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Original Communications.

IPECACUANHA, ITS STRUCTURE AND ADULTERATIONS.

BY LOUISA REED STOWELL.

DURING the year many specimens are sent to the Microscopical Laboratory for examination. The majority of these specimens are the commercial spices, such as mustard, cinnamon, pepper, etc., and the more common, or the more expensive drugs. Among the drugs sent for examination have been several specimens of Ipecacuanha. Although this drug has been reported by Bentley and Trimen and by Stillé and Maisch has comparatively free from adulterations—frequently having other roots substituted for it—yet the specimens sent here have all been adulterated more or less. Evidently powdered ipecac is losing its reputation for purity and will soon have to be classed with those drugs and spices commonly reported impure. The substances which were found to be mixed with the ipecac were of the simplest kind and can be detected under

the microscope by persons having had no experience in this line of work before. But to understand what belongs to the pure powder one should become acquainted with the physical appearance as well as the structure of the root itself.

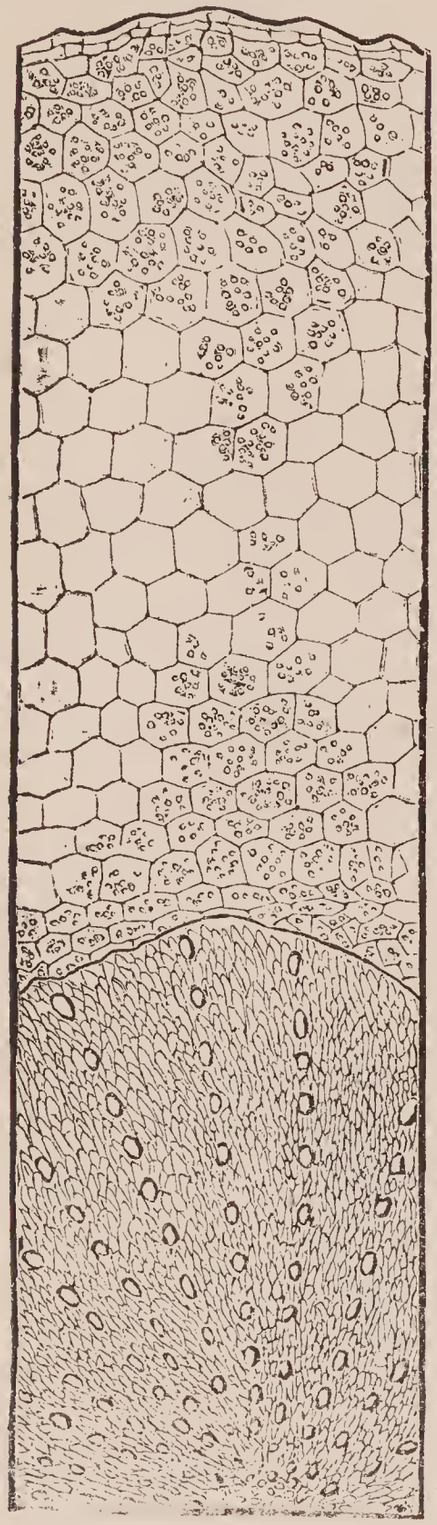


FIG. 1. Cross section of Ipecacuanha root. X 60.

The botanical name is Cephætis ipecacuanha while the common name is ipecac. It belongs to the natural order Rubiaceæ. It is indigenous to the damp forests of Brazil, New Granada, and the northeastern portion of Bolivia between about 8° and 22° south latitude. So it is entirely an imported drug.

The roots are numerous, spreading horizontally from their origin. At first slender and white, but when fully grown about $\frac{1}{5}$ of an inch in diameter. In preparing the drug for market the smaller roots are discarded, only those of an average thickness being used. They are long, seldom branched, of an orange-brown, or of a dull gray-brown occasionally almost black, irregularly bent and twisted and covered with a very thick bark. There are numerous deep longitudinal furrows running the entire length of the root, transversely marked by ring-like furrows closely packed together. The depressions between the rings being sometimes as deep as the woody cord. These corrugations frequently number twenty to the inch, and give the appearance of rings strung on a cord, hence the name annulated ipecacuanha, which is applied to this root and by which it is distinguished from the non-officinal ipecacuanhas. The woody cord is about $\frac{1}{20}$ of an inch in diameter, and when wet shows distinct medullary rays. There is no pith present. The thick bark composes about three-fourths the bulk and weight of the root, and separates readily from the woody cord.

The roots are collected at all seasons of the year, but principally from January to March. They are dried in the sun and packed in bales. About 15,000 lbs. are brought to the United States annually. Large quantities of the ipecac of commerce are damaged. They are injured by sea-water and by being gathered during the rainy season. The statement has been made that over four-fifths of the ipecac imported into England is damaged. It is also badly mixed with inferior roots both of the same and of other plants. The most of the substituted roots are nearly smooth, and non-annulated, others are medulated, farinaceous, with white woody cords. All are totally different from the true root. Woody stems are also frequently mixed with the roots. The most of these substitutions under the microscope possess a central pith.

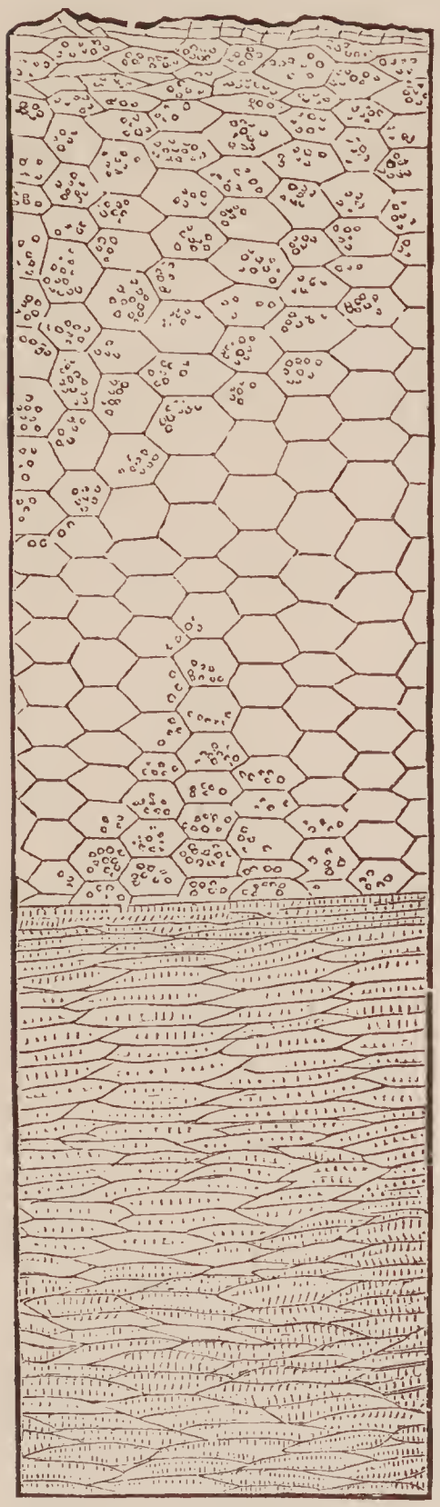


FIG. 2. Longitudinal section of Ipecacuanha root. x 60.

Powdered ipecac is of a light yellow-gray color, with a peculiar bitter, nauseating taste, slightly acrid. It has a faint musty odor; much of the odor is probably lost in the drying process. The wood is almost tasteless.

The microscopical structure of ipecacuanha is so characteristic, although quite simple, as to be a sure means of identification.

There is first a single layer of tabular cells, empty, flattened rather thick walled and of a dark brown color. [Some authors give several rows of these cells and call them cork.* But the best authority gives only one row. It is possible in the preparation for market, the epidermis together with some of the cork cells are

*Planchon, "Determination des Drogues Simples" vol. 1, p. 498, says "seven or eight rows of cells form the outer cork."

destroyed. If so it is a little surprising that only one layer of cells should so uniformly remain.]

The principal part of the root is composed of the bark consisting of oval or hexagonal cells, thin walled, with no intercellular spaces. The cells are loaded with starch granules. These starch grains are very minute averaging $\frac{1}{5500}$ of an inch in diameter. They are generally found in clusters of two, three or four, so when separated they will have one or more plane faces with the rest of the grain rounded. A minute depression or dark spot appears near the center of a majority of the grains. These starch grains are so different from the starches of the most of those substances used as adulterants, as to be easily dis-tinguished. Some of the cells of the bark are set apart to contain crystals in the place of starch. These crystals are long and pointed at both extremities, and found in large bundles of from twenty-five to forty lying side by side like Indian arrows. When confined within the cell they are never found crossing or lying at angles. They are crystals of calcium oxalate. (see *c* fig. 4.)

The central part is composed entirely of woody fibre, and medullary rays. The medullary rays consist only of nearly square, thin walled cells loaded with starch. They are much smaller, though resembling the cells of the bark. The woody portion consists of thick walled, short, pointed cells, with pitted walls. They are generally empty and it is the only part of the structure not loaded with starch. There is no pith in the center of true ipecac, though there is in the most of the substituted roots. The cortical portion is by far the more active portion of the root. The woody cord being almost inert.

Thinking some of my readers, who had had little or no experience in studying the drugs as they appear in market, so withered and dried, might like to examine ipecac, I will take a moment and help them. A small fair looking piece of the ipecac root should be placed in a dish of cold water for from ten to twenty hours—warm water for a short time will do, though it should not be boiling. Then with a sharp razor a section should be cut across the root just as thin as possible. There is no necessity of cutting the section complete, *i. e.*, having the whole of the root in the section. Only a very minute piece is needed, that will show both the bark and the woody center. Probably several sections will have to be cut before

one will be thin enough. Float this little section on the glass slide with a camel's hair brush. Holding the little piece in its place on the slide with a needle—the needle should have been wedged into a wooden handle for convenience—wash the specimen in water many times with the camel's hair brush, so as to remove as much as possible of the starch. The longitudinal section should be prepared in the same way. In cutting the longitudinal section care should be taken to cut near the center, so as to have some of the woody cord in the specimen. After these sections have been thoroughly examined under the microscope, the powdered ipecac can be studied. A drop of water is placed on the glass slide by means of the camel's hair brush and just a little of the powder taken on the point of the penknife and dusted over the water—only a small amount

FIG. 3. Potato Starch. x 375.

of the powder is to be taken. After protecting it with the thin glass-cover it is ready to be examined. Any one who has taken these steps, can test for themselves the purity of the powdered ipecac found in the drug stores.

The following substances are reported as having been found in powdered ipecacuanha: almond meal, licorice, corn meal and potato starch.

The presence of almond meal can be detected by the development of hydrocyanic acid upon infusion in water. The presence of the seed coats as well as the central part of the almond may be detected by the microscope. The central part or the cotyledons are composed of thin walled hexagonal cells, smaller than the cells of

the bark of the ipecac, and loaded with oil drops. They are entirely free from starch grains. Minute spiral vessels are frequently scattered through these cells. The outer seed coat or the dark brown scurfy part of the almond is made up of large oblong cells, with peculiar pits or dots covering the cell-wall. They are about $\frac{1}{500}$ of an inch broad and nearly twice as long. By the way, if some of these cells are scraped off from the outer surface of the almond and boiled in a solution of caustic soda they will make beautiful objects for examination with polarized light under the microscope. Almond meal is probably not of very common use for mixing with ipecac.

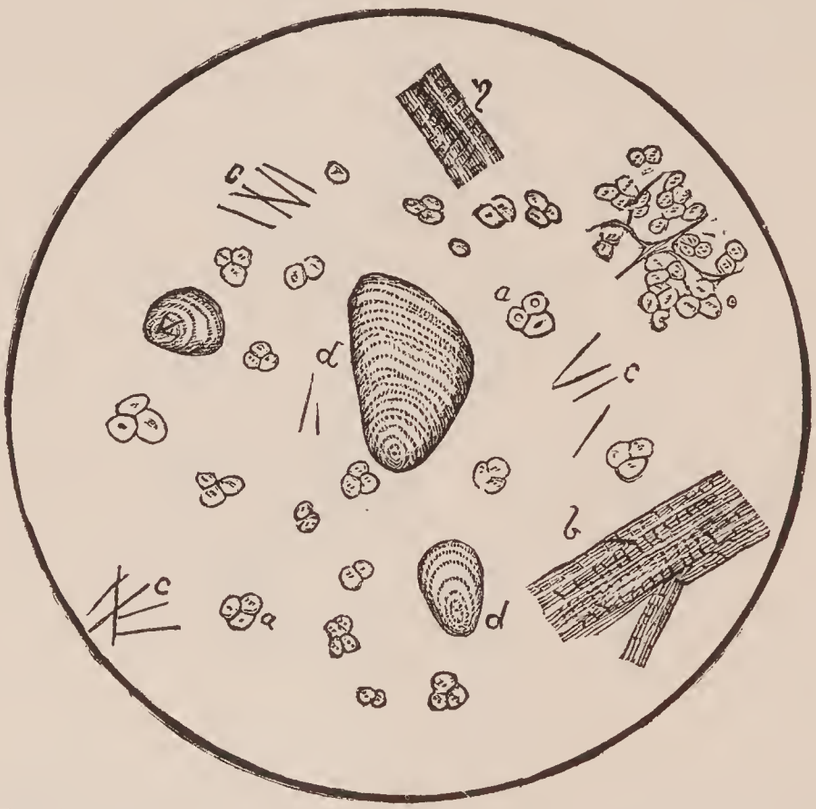


FIG. 4. Powdered Ipecac. a, starch grains of ipecac. b, woody fibre. c, crystals. Adulterated with d, potato starch. x 375.

A prominent druggist in one of our western cities told me he had found quite a large per cent. of the powdered ipecac, that was sent to him from the east, to be mixed with powdered licorice. The only way to become acquainted with the appearance of licorice under the microscope is to prepare and examine some of the root in the same way we prepared and examined ipecac root, and then to study some of the powdered licorice. This would hardly be necessary for the identification of licorice when it can so easily be detected by its taste and odor.

By far the most common substance used is potato starch. Of all the specimens of powdered ipecac which I have examined, every

one had more or less of potato starch mixed with it. Only two having corn meal. Potato starch grains are so very characteristic that it would be impossible for any one to mistake them under the microscope for the starch grains of ipecac. In fig. 3 is given an illustration of the starch grains of potato. Large, oval, or irregularly ovate grains. Each one possessing a nucleus or spot around which is seen numerous rings. Frequently these are as large as $\frac{1}{400}$ of an inch in length. A very simple way for obtaining some of these starch grains for study is to cut into a potato, and the fine white powder adhering to the knife will be the starch, or if a thin slice of the potato be shaved off and placed in a little water in a watch crystal the fine white sediment found at the bottom will be the starch. Fig. 4 illustrates some powdered ipecac adulterated with potato starch.

MEMBRANOUS DYSMENORRHŒA OR FALSE MOLE.

BY MRS. B. A. OWENS, M. D., PORTLAND, OREGON.

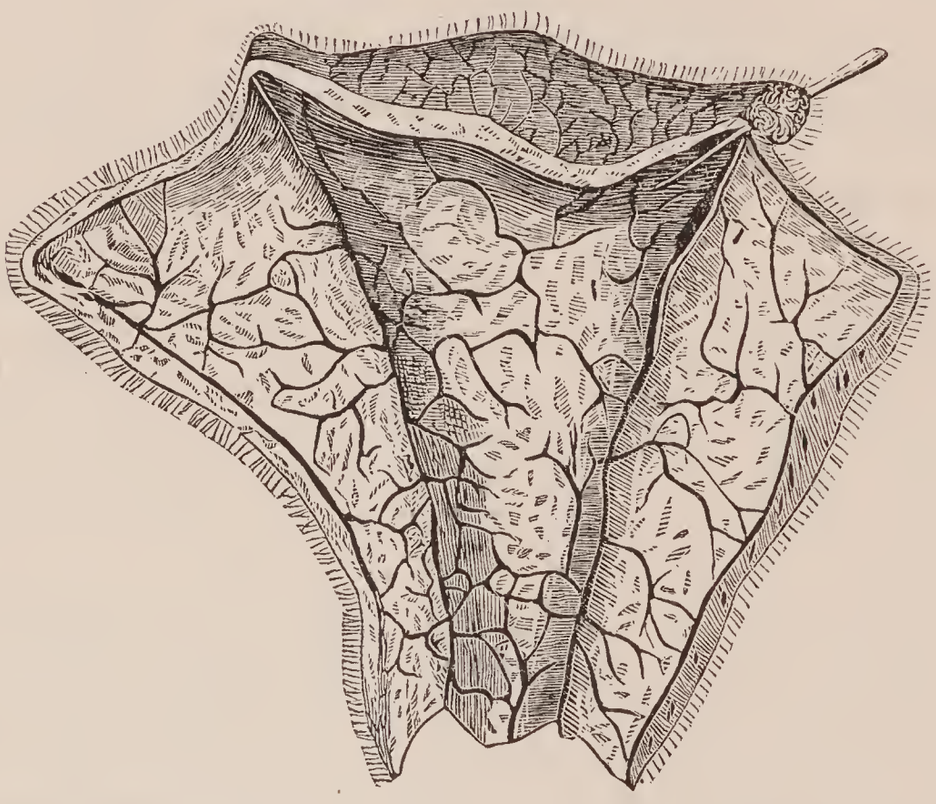
IT is not my intention in this short article to discuss the function of that old and familiar but vexed subject menstruation, upon which thousands of pages have been written and many beautiful as well as many homely theories have been created. That phenomenon which is so vital to the beauty, health and life of woman, like many of the phenomena of the human system, is still somewhat shrouded in a veil of mystery.

I shall attempt to deal with one variety of menstruation, that form known as "Membranous Dysmenorrhœa or False Mole." This, in my estimation, is least of all understood and most of all misrepresented. I cannot doubt that owing to the wrong teachings, and the ignorance of the profession, in this particular, the chastity of many has been suspected.

For the weight of authority to-day is to the belief that the "Decidua Membrana" is exfoliated or cast off during each menstrual epoch, either by the process of desquamation or fatty degeneration; also that this membrane before passing from the uterus is rapidly disintegrated and is cast off in minute shreds or completely dissolved.

Any departure from this process is considered pathological. When this membrane is cast off, says Prof. Thomas, either in shreds, in strips or as sac entire it then becomes membranous dysmenorrhœa. He also says it is of rare occurrence, having met with but five cases. That it is always accompanied by a peculiar set of symptoms resembling and often exceeding in severity those of abortion. This membranous dysmenorrhœa is considered a serious pathological condition that has thus far baffled the skill of the physician.

For the etiology of this most interesting as well as most important phenomenon we can only give a diversity of opinions. Prof. Thomas says "the want of accurate information depends upon the fact that the true pathology of the condition is unknown." Many, with Oldhime and Tilt, regard it as due to ovarian disease.



Membrane from case of Membranous dysmenorrhœa (after Coste).

Ricebarski, Labart, Handle, Jones and others, believe it to be a true desquamation of the uterine membrane, for which no cause can be assigned. Others say it is due to endometritis, but Thomas denies this on the ground that in four out of his five cases that disease was absent. It was formerly believed, and is still upheld by some that a layer of plastic lymph was thrown out over the uterine wall and then became organized.

Prof. Simpson attributes the exfoliation to an exaggeration of a normal condition or an exalted degree of physiological action. Emmet says but little on the subject. He considers it owing to a poor condition of the general health which retards the disintegration of the membrane. And again, others contend that it is due to *deciduous formation* which has been excited by conception. Many writers and teachers tell us in the most emphatic language that it is an easy thing to differentiate, by the aid of the microscope between the *true* and the *false* mole, of this variety. And upon this frail thread hangs and perchance will hang the good name of many a pure woman.

I shall now proceed to state my propositions as follows :

1. That membranous dysmenorrhœa (*so called*) is not of infrequent occurrence.

2. That it is not necessarily a painful condition.

3. That it is not an easy matter to determine between a true and a false mole even by the aid of the microscope.

In support of my first proposition I will state that during the last four years I have met with twelve cases of membranous dysmenorrhœa. During the last fifteen months I have met with nine cases. In a class of sixteen ladies, seven of that number were subjects of this *so-called* pathological condition. At the present writing I am acquainted with three ladies, members of the same house, all subjects of membranous dysmenorrhœa. If this is true it may be asked, perhaps, why it has not been discovered before. The reply might be, why should it have been discovered more than other phenomena that have existed since the creation of the world. But there are reasons in my opinion why it has not been brought to light.

1. Women have always been made to believe that menstruation in some way was a curse placed upon them, for which they had reason to blush. For proof of this you have but to consult the requirements of the old Jewish religion, that are as strictly obeyed to-day as a thousand years ago. You need not, however, go the Jewish nation for proof of this. Go, if you please, to our refined and cultivated ladies and you will find two-thirds of them so sensitive on this subject that they have not the courage to mention it to their own daughters. Consequently scores of young girls have been frightened and horrified at this seemingly unnatural phenomenon, and through

their ignorance have sowed the seeds of diseases that have carried them to early graves.

2. A thing that is very common attracts little attention. There is a prevalent idea among women that menstruation must necessarily be acompanied by symptoms more or less unpleasant. Knowing that a few days at most will bring relief, women patiently endure their sufferings at this period.

Physicians will bear me out in saying that, as a rule, the answers obtained from patients concerning this are vague and unsatisfactory. This is not due to lack of intelligence, but simply to the lack of attention on the part of women to this common occurrence. To illustrate, some months ago I was talking to an intelligent lady who complained of suffering a great deal of pain during the first day of menstruation. "Have you membranous dysmenorrhœa I asked ?" "Oh no," she answered, "I have nothing of that kind but I suffer great pain." I showed her a specimen preserved in alcohol and asked her if she was certain she had never seen anything of that kind. She thought perhaps she had, but had paid little attention to it; would look more carefully in the future. She soon brought me several specimens of "false mole."

In support of my second proposition I have four cases of *painless* "membranous dysmenorrhœa" to offer. These women are *strong*, *healthy* and *active*. *All* are employed in the most active pursuits of life, where the physical and especially the mental faculties are often most severely taxed. Yet menstruation with them has never interfered with their labors. Two of these ladies are physicians, one an editor and public lecturer, and one a teacher. Three of these ladies are married and mothers, respectively of one, three, and five children. The lady editor came to my office one day and handing me a parcel said, "Dr. I wish you would examine the contents of that paper. I cannot complain of indisposition, but really I fear something is wrong." When placed in water and cleansed it floated up, plainly showing the smooth, soft, inner surface, also the ragged follicular surface which to the unaided eye certainly resembles the "shaggy chorion."

Of the entire twelve cases which I have met in the last four years eight suffer more or less. Had I time and space I would present each case separately and in detail, but at present can do no more than simply refer to them. Three are ænemic and neuralgic;

two "were always delicate," one suffered from chorea during childhood. The two remaining cases are more serious ; one is compelled to keep her bed nearly if not quite the whole period, and suffers extreme pain. The other lady suffers much during the first twenty-four hours, sometimes longer. She becomes very pale, and finds much relief in rest. Both of these have serious uterine trouble sufficient in itself to account for these serious attacks. Both are unmarried.

In support of the last proposition I have only the testimony of others to offer, as I, myself, have never studied the subject microscopically ; but the testimony that I shall offer is of far more value than my own would be. Prof. Thomas in the last edition of his work on Gynæcology, says that the best microscopist cannot distinguish between a *true* and a *false* mole. While a student in the University of Michigan, Prof. Vaughan informed me that he had received numerous specimens of this nature for examination from young physicians who had gone out from the University ; but declared that he, as yet, had never been able to differentiate between so-called *true* and *false* moles. I shall leave Prof. Stowell to speak for himself, as he can do so far better than I can speak for him.

In conclusion I shall give as my opinion that if such persons as the above are in doubt upon this vexed question, it would be at least well for physicians to be somewhat cautious in diagnosing *abortion* from "signs and symptoms," even should they see *well defined blood-vessels* and what resemble the *villi* of the *chorion.* Especially should caution be observed if the patient is an unmarried lady.

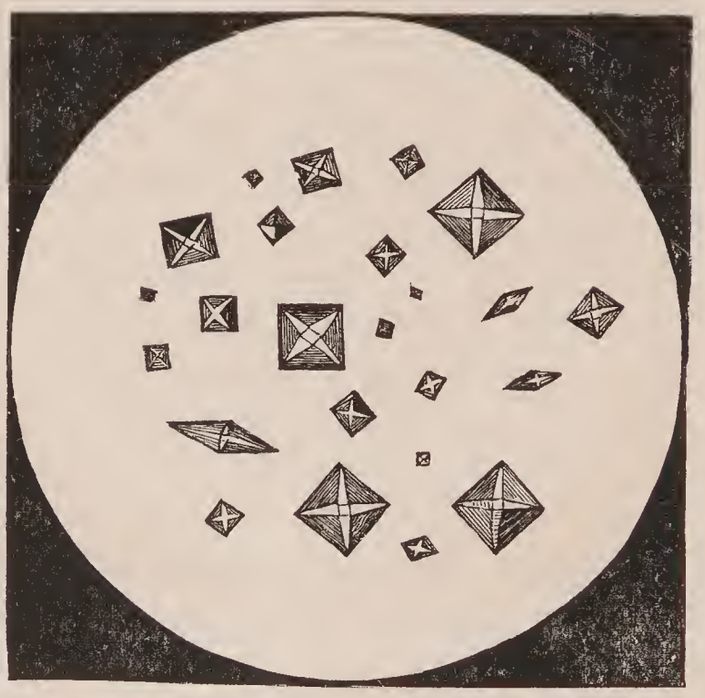
[Dr. Owens has sent me several specimens to examine, and they are well represented by the figure given above. The blood-vessels could be readily separated from the mass by careful teasing and washing. C. H. S.]

A CASE OF OXALURIA.

BY E. O. BENNETT, M. D.

THERE are many medical cases coming under a physician's observation in which the microscope is an indispensable aid to a proper diagnosis. Especially is this true when digestion and

assimilation are imperfect. When this condition exists the urine contains a variety of crystals whose form and composition can be detemined only by the strong power of a microscope. The following is a brief history of one of many similar cases met by the practitioner: Mr. W. McM., æt. 32, of Barry Co., Mich., consulted me in September last in regard to a dull pain in the lumbar region from which he had suffered more or less for two years, a part of which time he had been unable to attend to his daily duties. He stated that during this time several old physicians, whose diplomas, if they had any, antedated the use of the microscope in medicine, had treated him for "Bright's disease, rheumatism of the kidney, *kidney disease*," etc. As no analyses of his urine had been made, he was



Crystals of oxalate of lime, octahedral form. x 250.

directed to collect a 24 hour's specimen. On examination the quantity, specific gravity, and reaction were found to be about normal. The chemical tests gave negative results. A drop placed under the microscope showed no casts, but the field was full of oxalates of calcium, of the octahedral form.

Tnis was indicative that the patient was suffering from a condition known as *oxaluria*. He was prescribed nitro-muriatic acid and tonics, and in a few weeks the diagnosis was verified by the disappearance of all his former troubles. The crystals as seen in this specimen were well defined octahedra of various sizes. As

is seen by referring to the drawing some of the crystals were very small appearing as a mere point while others were much larger. They are occasionally seen as large as the $\frac{1}{300}$ of an inch in diameter. The urine should be examined for these crystals in a short time after it has left the bladder, for after the lapse of 36 or 48 hours they may appear in urine which was devoid of them at first.

These crystals very frequently accompany the urates, but as the former are insoluble and the latter soluble in caustic potash they are readily separated. The oxalate crystals, however, are soluble in the mineral acids.

Crystals of oxalate of lime. Dumb-bell form. x 250.

The dumb-bell forms are not so common as the others are and they are usually accompanied with the octahedral crystals.

The "nuclei" of many of the urinury calculi may be demonstrated to consist of these dumb-bell crystals of oxalate of lime.

HOW TO MOUNT THE STARCHES.

MANY of the starches are not only very characteristic but they are also very beautiful when viewed by transmitted or polarized light.

We have experimented a great deal to determine, if possible,

whether the individual grains could be well preserved for a long time, for they form an interesting addition to our cabinet. Our method of preserving the starches is as follows:

It is necessary first to have some aniline blue staining fluid, which we make after the formula given by Beale:

Soluble aniline blue, ½ grain.
Distilled water, 1 ounce.
Alcohol, 25 drops.

A mixture is made of equal parts of glycerine and water to which is added a very little acetic acid, only two or three drops to the ounce.

To this mixture of slightly acidulated dilute glycerine is added the aniline blue staining fluid until the whole mixture is of a decided blue color.

A drop of this mixture is placed on a glass slide and some of the starch to be mounted is dusted over the top. This dusting can be done to the very best advantage by touching the starch with a camel's hair brush and then slightly shaking the brush over the drop of colored glycerine.

The starch soon sinks in the mixture and the cover is applied. This method of dusting the starch is much better than stirring it in the mixture with a fine needle which almost invariably results in an admixture of air.

After the cover is applied it is pressed down quite firmly against the slide and all excess of the glycerine carefully removed. The slide is then transferred to the turn-table and a thin layer of dammar or balsam-in-benzole placed around the border of the cover. This soon hardens and in a day or two we can finish with the white zinc or Brunswick black or other cements.

The effect of thus mounting the grains of starch is this: the grains themselves have not taken the staining in the least, neither will they ever take it; they retain their natural appearance surrounded everywhere by the blue glycerine, and the effect is most beautiful.

Specimens are in our possession that were mounted over a year ago in this way and they are as perfect as the day they were prepared.—(L. R. S.)

Editorial Department.

"THERE IS NO ROOM FOR ANOTHER JOURNAL."

CERTAINLY no room for another medical journal, for we can scarcely count the number now, and we fear that if we should enter into the crowded field we should be trampled under foot and forever lost.

We do believe, however, that we are pioneers in the particular line of this journal, and our success or failure will depend largely upon the fact whether we have the pioneer pluck and perseverence, backed by the proper amount of cerebral matter.

We believe also that a field is ready for a journal of this character, but that there has been a "long felt want" for it we most assuredly do not believe. Neither do we believe the field ready for us is either a large or lucrative one.

We ask no more than the camel did; "only to get our nose in," resting upon the merits of our journal and upon the willingness of those interested in microscopical work to aid us. This aid may be one or all of three kinds; by sending in the dollars; by speaking a good word for us; and by contributing to our columns.

It is a fact that there is scarcely a medical college but that is more or less equipped with microscopes. Laboratory work is becoming general the world over, and the graduates of the schools of to-day are, as a rule, familiar with the manipulations and uses of these instruments.

We do not wish in the least to discuss or disparage the intelligence of those professional men who have never used the microscope, and who could not be induced to use it. They received their early training in a different way, and are not acquainted with the results to be obtained by a use of the instrument.

"We have had our average, yes, more than average success, and why try any experiments or run any risks?" Yet we venture to say that if this very class could spend six weeks in some of the microscopical laboratories, and there practically study the pathology of the secretions, excretions, and fluids of the body, see the diagnostic value of a few fibres or a few crystals, they would be even more

enthusiastic over the microscope than the recent graduate. Such, however, cannot be the case, and we look for our support largely from the younger members of our profession.

They have been taught in histology and pathology, the causes as well as the cures of disease. They should understand, if anybody, that to relieve the suffering and heal the sick is not all their mission. To understand the cause of disease, and thus better able to prevent it should be our most earnest endeavor. Preventive medicine occupies, and must forever occupy, a high and constantly ascending position in medical literature.

That physician who has nearest his heart the welfare of his profession and his fellow men, will be the most ready to investigate, and if worthy, to accept anything that promises to be of material aid in the study and diagnosis of disease.

With all the educational advantages of our times, with all the helps of every kind at our command, we are inexcusably negligent if we fail to start out in our professional career far ahead of our forefathers ; and the people, knowing this, expect and demand far more of the coming physician than they expected or had any right to expect of the new doctor of twenty years ago. Hence, personally, we have no sympathy whatever with that young man whose greatest study is to find a school with preliminary requirements of such a character that to enter is as easy as to slide down hill ; and with final examinations conducted in such a masterly way that no one is ever found deficient.

Realizing the importance of microscopical work to the physician, some of the medical journals have devoted regularly a portion of each number to microscopy ; notably in this line we have the *Cincinnati Medical News*, edited by Dr. Thatcher. In all these journals, however, medical topics are first, and microscopical ones are second. In this journal we propose to reverse matters ; and those subjects especially related to the microscope will receive the most prominence ; following these will be matters of general interest to physicians and pharmacists. These subjects will be presented under our "Editorial Abstracts."

Mrs. Stowell will have entire charge of the pharmacy department, the structure of drugs, their adulterations and how detected, etc. In time, then, we hope, through the columns of this journal, to show to the professions of medicine and pharmacy that the

microscope is not altogether an expensive plaything or an instrument to theorize upon, but that solid, practical good, invaluable help may be derived from its use.

We shall strive to present our subjects in such a way that the novice may understand and profit by them as well as, or even better than the expert.

We come to stay, and we ask you to give us a fair trial and also prove to us your good will by sending us your dollars.

C. H. S.

CONTRIBUTIONS.

WE ask our friends to contribute to our columns. You must know of cases where the microscope has been of use to you, or you are familiar with some methods of mounting, staining, or manipulating, or you have detected adulterations. If the microscope has helped you any let us know it, and if your articles will be plainer by using illustrations send those on too. Persons sending us original communications will receive a limited number of copies of the journal in which their article appears, if they ask for the same when they send the article.

This number is sent to nearly three thousand addresses as a specimen copy only, and will not be sent to them again unless they remit the subscription price of one dollar. Receipts of all moneys will be promptly acknowledged.

The journal will appear upon the first of each alternate month. You will confer a favor if you will send us the names of parties interested in microscopical work that we may forward to them a copy of this number.

ENCOURAGING LETTER.

WE have received the following letter from a noted divine: "* * * and if you will allow me the usual discount to clergymen I will take five pages of advertising with you. Will send a cut of my church, which is a most elegant and beautiful structure.

Place a strong drawing plaster over the lower part of the cut, I want to see if I can draw some of our prominent physicians into our evening meetings. * * *"

OUR NEXT ISSUE.

AN illustrated article will appear in our next issue on "The Microscropical Appearances of the Various Fibres, as Wool, Linen, Cotton, etc." We are making arrangements with our leading microscopical societies to have their meetings reported in brief for our columns, and we promise our readers something in this line in the future. We have just completed arrangements with the Calvert Lithographing Co., and thus we will be able to give our readers some fine lithographs in our next issue and in subsequent ones.

Editorial Abstracts.

IS MERCURY ABSORBED FROM THE SKIN?

IT IS stated in Foster's physiology that the balance of conflicting evidence is in favor of the view that soluble non-volatile substances, are not absorbed, and that volatile substances, as iodine, are not absorbed by the skin, but by the mucous membrane of the respiratory organs.

It is said that when salivation occurs from using mercurial ointments, it is because the particles of mercury are rubbed in the skin and thus reach the lymphatics. Prof. Fürbinger has been making some experiments on this subject which are given in full in Virchow's Archin, 82. 111, p. 491. The method employed, briefly stated, was to thoroughly rub the mercurial ointment on the uninjured skin, then wash the same and afterwards remove small pieces and harden them in alcohol. His experiments were conducted on various animals, including man. A careful microscopic examination of the skin was then made and particles of the mercury sought for. Globules were found all through the sebaceous glands and hair follicles and some had entered the ducts of the sweat glands. He found that the vapor of mercury will not penetrate the skin at all, being deposited simply on the surface. In all cases no mercury globules were seen in the skin tissue itself; they were closely confined to the sebaceous glands and hair follicles. If, however, the skin was abraded and then an ointment of mercury applied, the globules would enter the tissue of the skin and also into the ruptured blood-vessels. The globules thus deposited in the glands of the skin lost their metallic lustre after a few days, becoming oxidized, after which they were absorbed. Thus accounting for the persistent effect of mercurial inunctions.

TYPHOID FEVER.

IN a recent discussion on the treatment of this disease at the Metropolitan County's branch of the British Medical Association, Dr. Bristowe expressed his grave doubts as to the efficacy of

the cold baths so generally recommended of late. He related two cases which were fatal from pulmonary congestion which he believed was caused in each case by the use of the baths. He did not believe their effects as good as the statistics showed, for "if they were, their good effects should be obvious whenever they were tried." He regarded alcohol as seldom necessary and should be used only for its stimulating effects. He doubted if any remedy or remedies had any direct effect in controlling hemorrhage. Great stress was placed on a milk diet.

Dr. Broadbent does not rely upon a milk diet, but varies it as he thinks best. Opium enemata are used to control the diarrhœa, and large doses of opium to check hemorrhage by controlling peristalsis ; opium also was the chief remedy for tympanites.

Dr. Collie had abandoned the bath treatment altogether as not only useless but positively dangerous. "Good nursing," says he, "will cure seventy-five out of every hundred cases, fifteen out of the remainder will die and ten might or might not recover."

NEURALGIA.

SEVERAL cases have been reported within the past two months where this painful affection has been relieved and evidently cured by nitro-glycerine. One severe case of Sciatica is reported as cured. This case was so severe that all remedies had failed and the attending physician was about to stretch the nerve when nitro-glycerine was suggested to him. The patient was given the fiftieth of a grain four times daily, and the relief was almost immediate and a permanent cure is confidently expected.

In facial neuralgia it has given better results than could possibly be hoped for. Small doses are given and in the majority of cases reported relief was immediate and a cure certain. If there be another side to this question it is to be regretted that the profession cannot know of it and thus the true value of the agent obtained. "But who enjoys telling their failures."

SEPTIC POISONING FROM VACCINE VIRUS.

DR. KEWLEY of Chicago reports some cases where severe symptoms followed an ordinary vaccinnation, when bovine virus

and ivory points were used. He usually vaccinnates two persons with one double-dipped ivory point. Whenever one of these vaccinnations runs a normal course the other one does also ; if one of the pair should suffer severe symptoms, the other would also. He has noticed that whenever the points present, to the unaided eye, evidences of blood or semi-purulent matter that they are invariably the source of much mischief, hence they are discarded altogether. A microscopical examination would have aided in the matter perhaps.

DIPHTHERIA.

DR. GAUTHIER of St. Paul, Minn., tells in the Chicago *Medical Review* of his success in an epidemic of diphtheria by the use of iodine. He has treated 200 cases with but two deaths, while before adopting this method he lost one third of all his cases. The treatment is as follows: The patient is ordered tincture iodine in ten to twelve drop doses every hour, well diluted with water, so long as the fever lasts, subsequently reducing to ten drops every two, and finally every three hours. Local applications are made use of at the same time. These latter should be made by the physician at least twice a day. For internal use the decolorized tincture is used. Bread and starchy articles of diet are used in abundance.

SALE OF CHICORY FOR COFFEE.

A PROVISION dealer of Higher Hillgate, Stockport, was arrested and charged with selling adulterated coffee. Mr. Jacob Marshal, one of the town sanitary officers, purchased of the dealer, Wm. Morley, one-half a pound of ground coffee and paid seven cents for the same. A microscopical examination was made which showed a large per cent. of chicory present. The defendant pleaded ignorance of the strict adulteration laws in England, admitting that he knew the coffee was not pure for he himself had mixed the chicory with it, but he did not for a moment suppose that he would have to label it as a mixture of chicory and coffee. The presiding magistrate decided that it was a great fraud upon the public to sell an article

of food adulterated as this was more than fifty per cent., and the defendent was fined 40s and costs.

MICROSCOPIC TESTS FOR POISONS.

PROF. ROSSBACH has just published, in the Vienna *Klinische Wochenschrift*, some remarkable delicate tests for the presence of poisons when they are in too minute quantities to answer to any chemical tests.

As small animals, like frogs, mice, etc., are known to be very susceptible to the action of certain of the poisonous alkaloids, so this fact is taken advantage of and very weak solutions introduced into their circulation. Delicate and wonderful as the tests are as applied to frogs, etc., still Prof. Rossbach gives far more delicate ones. A drop of water containing infusoria is placed on a glass slide and examined uncovered. The infusoria are examined carefully as to size, form, color, etc., then a drop of the solution is placed just to the edge of the fluid containing the infusoria. If organic poisons be present the infusoria are instantaneously destroyed, becoming a formless sediment. He startles us with his figures. "If a drop of water containing infusoria and weighing .001 grain be used as a test the quantity of strychnine required to cause remarkable changes will be .00000006 of a grain. In this way $\frac{1}{15000000}$ of a grain of atropine can be detected." Thus, he says, if the stomach of a person poisoned by strychnia contains a *litre* of fluid and only ¾ of a grain of the alkaloid, a single drop of this fluid will contain 40 times as much strychnine as necessary for the test.

INFANTILE DIARRHŒA.

DR. GUERIN says, in the *Medical Record*, that he successfully meets this trouble by adding half a teaspoonful of powdered charcoal to a bottle of milk. The greenish stools change to their normal color and increase in consistence.

The milk used is diluted with one-half or one-third of its bulk with sweetened water.

MEMBRANOUS DYSMENORRHŒA.

IN THE *Archiv für Gynakologie* is an article by Dr. Colinstein on this affection. He asserts that it is not due to local changes but rather to the general conditions of the system. Of 62 cases collected by him general disorders were found three times as frequent as local ones. He gives his reasons for believing that this disorder is connected with hysteria. His conclusions are hardly correct ones, at least so it seems to us, and we are inclined to think he has not established his point.

DIABETES MELLITUS.

PROFESSOR Flint has recently said that the treatment of this affection must be emphatically dietic. The diet should receive the most careful attention and a list of the articles which the patient can eat as well as a list of things he positively must not eat should be at hand. Bread will cause the most trouble and the patient will soon feel that he cannot do without it. So-called diabetic flour, consisting of bran finely ground, is without nourishment and the patient soon tires of it.

He especially recommends the gluten bread prepared by the Health Food Company of New York, corner of 10th St. and 4th Avenue. This bread is not entirely without starch, yet it has but a small amount of it and still retains the agreeable qualities of ordinary bread. No medicine is prescribed at first and many times the sugar in the urine may disappear altogether for a time, and certainly permanently lessened. The only remedy mentioned is sulphide of calcium in from ⅛ to ¼ grain doses three times a day. In this remedy, however, but little confidence is expressed. "This disease I believe may be kept in abeyance indefinitely by appropriate dietetic treatment, and yet I am extremely doubtful whether a patient can ever properly consider that there is a permanent recovery."

Selections.

"There is Not Much In It."—This expression, which we have adopted for a heading, was recently made by a physician who does not reside more than a hundred miles from Cincinnati, when the microscope was mentioned to him by a layman. Of course, our readers will suppose he must be a very ignorant man and of no standing in the profession. But we will assure them that they are mistaken. On the contrary, he considers himself, and is considered, both by the community and the most of his medical brethren as eminent in his profession, and is of high standing socially. Although he has not a college education, yet he is regarded as an intelligent man, and has written not a little for publication. We believe, too, that he has been called upon to make addresses away from home.

Such an expression from such an individual is remarkable, and we scarcely know how to account for it. If he was a grossly ignorant man, of but little modesty, and full of ignorant self-assurance, we would unhesitatingly ascribe it to his ignorance; for it is difficult to imagine that there can be one of any other class that would be disposed to depreciate the value of the microscope. Has there been any other instrument that has accomplished more, if as much for science? Certainly medicine is more indebted to it than to any other. It has done so much here, that we scarcely know how to begin to tell what it has done. In fact, it really seems to us, at a glance, to have done everything. Without it there could have been no science in medicine at all. "To begin with the beginning"—histology. Without the microscope there could be no histology—*i. e.*, such a branch of knowledge. The foundation of all structure is the cell, and its increase is the increase or multiplication of cells. But we could not have known of the existence of such a body as a cell unless the microscope had revealed it. And it also revealed how cells are multiplied by division; tissues, structures, and organs thus created. But we have not time nor space to recount from the beginning, in regular order, how medicine has been built up into a science and art by means of the microscope. We will only mention at random, what we would not have known anything about if it had not been for the revelations of the microscope, and

then we will let the gentleman who considers "there is not much in it" think over to himself what we do know. The red and white corpuscles of the blood, although of the highest importance both in health and disease, and in the latter, often have our remedies directed to them, are so exceedingly minute in size that they cannot be seen by the unaided eye, and consequently we never could have known of their existence without the microscope. Nor could we have known without it anything in regard to the net-work of capillary vessels that connect the arteries and veins. Turn the attention to the prima via, commencing with the lips, lined with mucous membrane throughout its whole length. How studded is it from commencement to termination with most important organs, all of which are microscopical in size. We could have no knowledge how digestion and absorption take place, if we had not the means of magnifying the size of the organs by means of which it is accomplished. How came we to know of the ascini of the liver, containing a portal capillary within and the other vessels disposed without? Without magnifying lenses we could have known nothing of the peculiarities of the hepatic circulation. And the same can be said of the novelties of the arrangement of blood-vessels of the kidneys, and the curious Malpighian bodies which the microscope exhibits so beautifully. And these singular bodies remind us of the spermatozoa and their active movements, which are microscopical.

But the gentleman who thinks there is not much in the microscope, may say that he admits that the microscope has done much in histology, etc., but that the general practitioner, having learned all about its discoveries in books, has no need of the instrument in his practice. Consequently, "there is not much in it" for him, for he has no time to study histology. We think, however, he would be a better doctor if he only studied the histology of the leaf of the flower occasionally, for which he might certainly find some time now and then. But the microscope is of the most important service in practice, so much so that it ought to be called into use every day. The information which is obtained from urinary deposits has now become so important by the progress of pathology that the intelligent physician feels called upon to examine them in a large number of his cases; and the microscope by defining the crystals or exhibiting epithelial cells, tube casts, etc., discloses, oftentimes, at once the most important information. Again, how often is the medical attend-

ant put into the possession of valuable information as regards the character of a lung affection by what he finds in the sputa of his patient? In anæmia and chlorosis he frequently learns much by examining the blood. In discriminating secretions and excretions he often finds use for his lenses, also, often in making out peculiar tissues. Really, there are so very many uses for the microscope by the physician in the way of his practice, which suggest themselves to us, and which we would suppose would occur to the minds of all, that it seems absurd to enumerate them in the way of evidence of the value of the instrument to every practitioner. We feel sure that *we* could not dispense with it.

Let any of our readers take up a work on medical jurisprudence, and we feel sure that they will find abundant evidence of the value of the microscope as a medical instrument. By it the physician can determine at once whether certain stains are blood stains or not; and if they are, whether the blood is that of the mammalia or not. But this will suffice. Scores of pages of almost any work upon medical jurisprudence will illustrate the importance of the microscope.

We do not wish to be suspicious, but we cannot help suspecting that the medical gentleman who has been reported to us as speaking disparagingly of the value of the microscope was induced to do so because he himself had no practical knowledge of the use of it; and, consequently he desired to excuse his ignorance by depreciating it. We hardly believe, though, that he will be able to deceive any one. —*Cincinnati Medical News.*

Action of Carbolic Acid upon Ciliated Cells and White Blood-corpuscles.—Since as far as statistical data are reliable, the results of operations, except in certain classes of cases (ovariotomy, etc.) are equally as good in the hands of those surgeons who use carbolic acid as a dressing agent only, as in the hands of those who adhere strictly to the Listerian doctrines and details, it is a matter of interest to know just what may be the effect of carbolic acid, in varying degrees of strength, upon living tissue. Its beneficial effect may be largely due to its direct action upon the tissues of the healing wound. For experimentation, ciliated and white blood cells were chosen by Dr. T. M. Prudden, since in these

the effect of carbolic acid upon the vitality of cells could be most easily seen.

He used solutions of varying strength, from $\frac{1}{20}$ to $\frac{1}{3200}$. The most extended series of experiments was made upon the frog; and less extended ones upon the blood of the rabbit and man.

The result of the experiments shows that "carbolic acid in solutions of $\frac{1}{100}$ and over, causes either immediately, or in a short time, cessation of vibration in living ciliated cells, with a rapid, characteristic disintegration of their protoplasm and death of the cell."

With solutions of $\frac{1}{50}$ the ciliary movement ceases in a few seconds, the movements becoming gradually slower and slower. If the movement of the ciliæ is languid it is temporarily quickened when the acid is first brought in contact with the cell. As the ciliæ cease their motion degenerative changes occur in the protoplasm of the cells. It is resolved into two kinds of material—one clear, transparent and feebly refractive; the other strongly refractive, appearing as shining globules. "The nucleus shrinks, not infrequently exhibiting, as it does so, distinct movements in the intra-nuclear net-work; and especially noteworthy in solutions of this strength is the development in a large number of these cells, within a few minutes, of a wedge-shaped, more or less refractive, sharply outlined net-work, extending from the ciliary border to the nucleus, within which are sometimes seen delicate parallel lines, perpendicular to the free border of the cell.

This peculiar net-work, lying invariably between the ciliary border and the nucleus and never extending below the latter, would suggest a difference in the structure of the protoplasm in this part of the cell which is not without significance in view of the present uncertainty of our knowledge concerning the relations between the ciliæ and the nucleus and the cell body. (Does not the author accept the researches of Klein? ED.)

The shining globules tend to coalesce and gather outside the cell body within the first forty-eight hours."

"In very dilute solutions ($\frac{1}{400}$ to $\frac{1}{3200}$), carbolic acid may cause if long continued, slight degenerative changes in the protoplasm and the death of the cell; but its most noteworthy action is its inhibitory effect upon ciliary movement. This may be retarded by it, or even entirely checked, without necessarily determining the

death of the cell, for on its replacement by an indifferent fluid, the movement may be perfectly re-established and continued indefinitely." These phenomena seem equally true of cells observed *in situ* and of these scraped from their place and teased apart.

The white blood cells were examined, not only when removed from the vessels, but also in the vessels of the tongue, mesentery and bladder of the frog. If the white corpuscles, while being examined in the glass slide, be irrigated with a $\frac{1}{100}$ solution, amœboid movements ceases almost instantly, and very soon the protoplasm breaks up into larger and smaller strongly refractive granules or globules, and a finely translucent substance which retains the form of the shrunken cell. The nucleus is more or less jagged in its outline. With weaker solutions the same phenomena are to be observed, but they are developed much more slowly.

If those which have been treated with weak solutions, and whose movements have been stopped, are washed clean with a neutral solution, the movements will usually return.

If a freshly exposed bladder be irrigated with a solution $\frac{1}{50}$ to $\frac{1}{100}$, it soon becomes cloudy, and stasis will occur almost immediately in the capillaries, gradually extending to the smaller and larger veins and arteries. The red blood cells lose their symmetrical form, becoming permanently cut and curved and occasionally swollen. Sometimes they will cling closely to the sides of the vessel. To these, others are joined in little heaps, thus partly blocking up the tubes, or, instead of being thus piled up, the red cells may lie along the wall, side by side, in a single or double layer, thus making a cylindrical investment around the blood current, which still flows but with impaired velocity. Gradually, however, more and more accumulation takes place, until, finally, the current is stopped. Thus thrombi and emboli are formed partly, as is evident by changes in the red blood cells. The white cells under these circumstances do not collect in the peripheral zone of the current, but are mingled indiscriminately with the red ones. They invariably retain their round form. This condition, which has been called, "globular stasis," does not undergo resolution, if far advanced.

With solutions of $\frac{1}{800}$ to $\frac{1}{3200}$ there seems to be no tendency to stasis or thrombosis. If a solution of $\frac{1}{1600}$ be used, there is a slight dilatation of both arteries and veins, which seems permanent so long

as the part is exposed to the carbolated solution, no change in the capillaries is observed. The current is also at first slightly accelerated, but then becomes slower than normal, and so continues. At first the normal peripheral and axial currents are observed. A greater or less number of white cells may be seen rolling or gliding along the walls and even adherent to them. Soon, however, the peripheral zone becomes less and less distinct, and the axial becomes broader. The white cells, which were as first attached to the walls are loosened, and are carried off by the current. Those which drag along the periphery are mostly globular, and exhibit but slightly the well marked appearance of stickiness. This condition lasts as long as the carbolated solution is applied, but the normal phenomena will return if the carbolic acid be washed off with an indifferent fluid. No structural changes could be seen in the white blood cells which had been rendered quiescent in the vessels by solutions as dilute as $\frac{1}{1600}$.

It is therefore, evident that even weak solutions of carbolic acid have the power of checking the emigration of blood cells; and thus a "part of its favorable action in restraining suppuration may be accounted for, at least in so far as pus is the result of the emigration of the blood cells."—*Chicago Med. Journal and Examiner, from Am. Jour. Med. Sci.*

Items.

When is a doctor most annoyed? When he is out of patients. —Ex.

"The first requisite for success in life is to be a good animal."—Herbert Spencer.

"Why should not ducks be allowed on doctors' premises?" "Because they make such personal remarks."—Ex.

A medical student says he has never been able to discover the bone of contention, and desires to know if it is not the jaw-bone.—Ex.

Dr. Neisser has discovered a peculiar form of micrococcus in the gonorrhœal discharges of both sexes, circular or oval in outline, in colonies of ten, twenty or more, surrounded by a membrane — *Centrablatt fur Med. Wis.*

Mr. K. M. Cunningham suggests a quick way of getting marine Diatomaceæ; by taking a peck of fresh oysters and brushing the back of each into a basin of water, this process will give Pleurosigmæ and Coscinodisci in abundance.—Ex.

Dr. Ephraim Cutter, having studied the central surface-waters of several ponds and lakes in Massachusetts, has found, contrary to the general opinion, that the waters in the middle of those bodies contain large numbers of microscopic forms of both animal and vegetable life.—Ex.

"Have you given electricity a trial for your complaint, madam?" asked the minister as he took tea with the old lady. "Electricity!" said she. "Well, yes, I reckon I has. I was struck by lightning last summer, and hove out the window, but it didn't seem to do me no good."—Ex.

The National Board of Trade having offered prizes for essays on the adulteration of food, announces through its committee on the examination of these essays that none of them produce any definite or satisfactory evidence of dangerous adulteration of food. Confectionery, milk, liquors and drugs are the articles most subject to adulteration.—*Health Monthly.*

Prof. Tait states that a flash of lightning is of such short duration that the eye could not possibly follow its movements. When a flash appears to start from one point and extend, it is because the spectator sees first that part of the flash of light toward which his eye is directed, and the rest of the streak is appreciated later by the less sensitive portions of the retina.—Ex.

Formation of Vinegar by Bacteria.—E. Wurm has investigated this matter, and his results prove, without doubt, that an active formation of vinegar from alcohol is obtained by means of Macoderma aceti (Bacterium mycoderma—Cohn), thus supporting Pasteur's views.—*Science.*

Organisms in Beet Sap.—The bodies known as "frog-spawn," which make their appearance after a time in the sap of the beet root, prove, on microscopic examination to be a species of bacterium, called by L. Cienkowski, Ascoccus Bilrothü.—Ex.

It has been found by several microscopists that the cause of whooping-cough is a peculiar fungoid growth, which first germinates under the tongue and then pervades the air passages. Quinine is found to be a valuable antidote by virtue of its well-established power to destroy microscopic vegetable organisms.—Ex.

Thin glass covers.—A microscopist has taken the trouble to measure the thin glass covers purchased at a first class house, and found that in two ounces but one third were correct in their thickness $\frac{1}{150}$ to $\frac{1}{200}$ of an inch, two-thirds belonging to a cheaper grade. Only one sixty-eighth were $\frac{1}{200}$ of an inch in thickness, the majority being only fit for opaque objects.—Ex.

Poisoned by Postage Stamps.—We hear of a young man belonging in this city who has recently been quite severely poisoned by corrosive sublimate contained in the mucilage upon postage-stamps which he moistened with his tongue as he stuck them upon some 200 envelopes. The poison had been taken in sufficient quantities to produce violent pains in the abdomen and limbs, and other symptoms of quite an alarming nature. We believe the young man was confied to his bed for some days.—*Keene* (N. H.) *Sentinel.*

Reviews.

COMPENDIUM OF MICROSCOPICAL TECHNOLOGY. By Carl Seiler, M. D., late Director of the Microscopical and Biological Section of the Academy of Natural Sciences of Philadelphia; Curator of the Pathological Society; Pathologist and Microscopist to the Presbyterian Hospital, etc., etc. 130 pp. 16 ill. Price $1.00. D. G. Brinton, Publisher, Philadelphia.

The subject is treated under the following heads: 1. The Microscope and how to use it. 2. Preparation of animal tissues. 3. Cutting sections. 4. Staining of tissues. 5. Injecting the vascular system. 6. Mounting and finishing of specimens. 7. The preparation of vegetable tissues. 8. Photo-micrography with an appendix of fifteen pages on the different tumors.

We have read this book through and have carefully noted its many practical suggestions. It is a book that the practical microscopist cannot afford to be without. It is not simply a compend of Frey's large work, neither is it a repetition of the rules and suggestions of other writers. The author has given us his own methods and ways, some of which are entirely new.

We are forced to disagree with him on one point at least, for when it says that "artificial light, such as is obtained from a good kerosene lamp, is to be preferred to daylight, for the simple reason that the former can be controlled as to its brilliancy, while the latter is beyond our control" it says what is not our experience. We have never found any light so good as a light by a north window. Still we have had but little experience with artificial light, and this may account for our poor success with it. The author's mechanical knife carrier is illustrated, and its manner of use described. With this carrier the knife is moved over the well of the microtome in a slanting direction so that each point of the edge describes a curve which is equal to a part of a circle. It is the chapter on staining that most interests us. A very easy method is given for preparing a carmine mixture, and the double staining which has characterized so many of the author's specimens is described fully.

The chapter on the mounting and finishing of specimens is well worth the price asked for the book, for who is not aware how much it adds to a specimen to have it neatly and tastefully mounted. We repeat then, that if anyone intends to keep posted on the better ways to prepare and mount tissues, both animal and vegetable, they cannot invest a dollar to better advantage.

THE MICROSCOPE.

AND ITS RELATION TO

MEDICINE AND PHARMACY.

Vol. 1. Ann Arbor, June, 1881. No. 2.

CONTENTS.

PAGE.

Original Communications.

The Microscope in Skin Diseases. By C. C. Yemans, A. M., M. D.... 33
The Commercial Fibres. By Louisa Reed Stowell.... 38

Correspondence.

Protococcus Plunalis.... 42
Shellac Cells.... 42
Prizes.... 43
Drug Adulterations.... 43

PAGE.

Editorial Department.

"It will do for Babes,".... 44
Editorial Briefs.... 46
Editorial Abstracts.... 47
Selections.... 50
Items.... 55
Reviews.... 63
What Our Friends Say.... 64

Original Communications.

THE MICROSCOPE AS AN AID TO CORRECT DIAGNOSIS IN CERTAIN DISEASES OF THE SKIN.

C. C. YEMANS, A. M., M. D., PROFESSOR OF DISEASES OF THE SKIN IN MICHIGAN COLLEGE OF MEDICINE.

HEBRA says: "For the recognition of diseases of the skin no other assistance is required than a knowledge of the objective symptoms which are visible on the surface of the body in each particular case. We do not attach any value either to the history or the subjective phenomena in investigating a cutaneous affection." While I cannot accept this dictum of the world renowned professor, I think it well to call attention to the importance of objective symptoms in diagnosis.

On the other hand with our progress in pathological knowledge the study of subjective symptoms assumes an important relation not to be overlooked because they have been the hiding place of insincere pretenders who have often relegated all skin diseases to that unknown realm "diseases of the blood." It is the purpose of this paper, however, to call attention to those objective symptoms which yield us the pleasure and the profit of correct opinions. It is not my province to discuss the relative value of microscopes or the management of the same as that can be done by those whose opinions are sustained by knowledge and experience in that special department of microscopy.

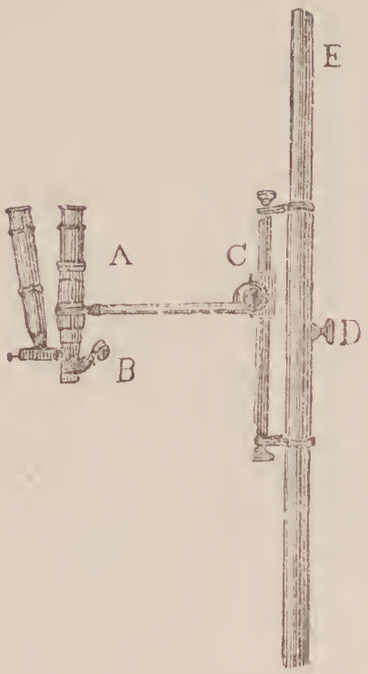
Our observations will lead us to consider two conditions:

1st. Examination of skin lesions *in situ*.

2nd. Examination of those parasitic growths which give as a sequence certain skin lesions. Practically either is important, but the latter requires more skill and possibly is more helpful to those whom we serve. I desire to remark in passing that in this as in other departments of medicine accuracy of diagnosis is the key to success, and no instrument gives better precision in this than the microscope.

For examination of the skin *in situ* only low powers are requisite with special mountings, while for the other any microscope with a magnifying power of 250 diameters or more will suffice, *i. e.* the same instruments which are adequate for fine diagnosis in other departments of medicine, as for instance urinary analysis or pathological or histological investigations. For example Sycosis parasitica or Favus has been treated per orem for months in some cases for years even with no relief, as the least reflection will convince one must be in this case, while the microscope was ready to differentiate and indicate the treatment and so diminish the time of recovery, as a rule, to as many days or weeks at most. In many cases a careful examination of the entire surface is necessary for a correct knowledge of the lesion or lesions for one may not be limited to one lesion at the same time.

For this purpose a good double convex lens of low power may be quite sufficient, but in case a higher power is required I have had mounted in my office by A. Kuhlman, of this city, a monocular (binocular is better,) similar to one used by Dr. Piffard in New York, a cut of which is here kindly furnished by MacMillan



& Co., publishers of Dr. Piffard's admirable work, "Diseases of the Skin." By this adjustment the patient can be examined in any posture, standing, reclining, or sitting, with much accuracy and ease. By these low powers cases of alopecia can be well studied. In certain stages of either eczema or psoriasis a differential diagnosis is well nigh impossible by natural vision, while with the lens the case becomes quite simple, points in diagnosis being clearly observed.

Acne is sometimes confused with secondary tubercles. Acne has its papular stage. Acne is usually preceded by comedo, and is always on the site of a sebaceous follicle, either of the first or second class, which can be readily observed by a double convex lens.

These cases are full of annoyance and concern for both patient and friend. With a clear diagnosis one can treat successfully those lesions amenable to our art by aid of the valuable treatises of American Dermatologists. I say American, because I believe we have produced the best authors and practitioners in this specialty.

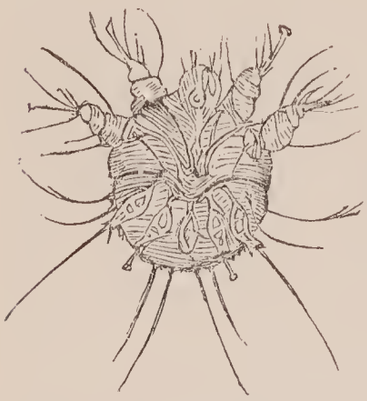
So much for examinations of lesions themselves. On the other hand we have to meet many lesions which are but in the order of sequence the cause being only discernible in some cases by microscopic aid and with those for the most part this paper is to deal.

These diseases are in general Morbii Cutis Parasitica. The parasite being either; I, Animal, or II, Vegetable.

Of the animal parasites but slight mention need be made as the parasite is readily detected by the naked eye if carefulness is used in the search. The Itch mite is more difficult to discover but is readily found by the microscope. The lesions also are quite characteristic; for instance:

Pediculus { I, Capitis. II, Corporis. III, Cruris.

Scabies. Dr. Bononio was among the first to detect the parasitic character of the disease known as the itch. On turning one out of the pustules from between the fingers with the points of very fine needles under the microscope a minute animal was discovered very



nimble in its motion covered with short hairs having a short head a pair of strong mandibles and eight legs terminating in remarkable appendages each provided with a sucker. It has no eyes but when disturbed it quickly draws in its head and feet and then somewhat resembles the tortoise in appearance; its march is precisely that of the tortoise. It usually lays sixteen eggs which are carefully deposited in furrows under the skin and ranged in pairs; these hatch in about ten days.

Hogg describes the Demodex Folliculorum as follows: "it is another remarkable parasite found beneath the skin of man; it is sometimes obtained from a spot where the sebaceous follicles are abundant such as the forehead the side of nose and lip. If the part where a little black spot is seen or a pustule be squeezed rather hard the oily matter there accumulated will be forced out in a globular form; if this be laid on a glass slide and a small quantity of oil added to it to cause the separation of the harder portions the parasite will in all probability float out after the addition of a little more oil. It can be taken away from the oily matter by means of a fine pointed sable pencil brush and transferred to a clean dry slide.

By far the most difficult cases however are vegetable parasites which cannot be found except by high powers. Of these we have many species the habitat of which must be considered as well as the special parasite in order that we may not be in error *i. e.*, those which inhabit the appendages of the skin, follicles, hairs, nails, etc. Those which grow upon the integument *per se*. I will now take up in detail, such cases as have come under my observation. A German woman of 26 having with her two children in like condition with herself came to my clinic. Her head was covered with an offensive crusting; the hairs were broken and dry. She had suffered from this for many years. I removed some of the crusts and sent them to Dr. John H. Lobdell "Instructor in Microscopy at Michigan College of Medicine, for examination to aid in diagnosis, and received the following reply.

FLAT ROCK, Mich., May 12, 1881.

I received from Prof. Yemans April 14th, 1881, a few scales supposed to be from a case of favus, with the request that I would make a microscopical examination and report to him before his next clinic hour.

I took some of the scales and examined them (dry) with a power of about 400 diameters, but could find nothing more than a few epithelial scales. After placing some distilled water upon the scales, I broke them between the cover glass and slide. Upon again examining them I found a few blood corpuscles, broken down epithelial cells, several pus cells and a number of small globular bodies or cells, somewhat smaller than a human blood corpuscle (red). These cells were of queer shape and I suspected that I had the so called achorion schoenleinii, after a further examination I found two and more of the bodies united like the mould fungi. I reported the case to Prof. Yemans and he has since told me that by using anti-parasitic treatment there has been an improvement. I distinguished pus corpuscles by action of dilute acetic acid. The acid had no action upon the achorion Schoenleinii. See diagram. Respectfully yours,

J. H. LOBDELL, M. D.

PHYTOSIS VERSICOLOR, (PIFFARD), OR PHTHEIRIASIS VERSICOLOR, (FOX) FUNGUS, MICROSPORON FURFUR.

Phytosis versicolor commences by the appearance of small, irregular yellowish-brown spots, very slightly, if at all, elevated above the surface of the skin, and covered with barely perceptible scales. It usually begins upon the chest, extends gradually over the whole of this region, mounts upon the neck, and descends to the abdomen. It may also stretch round to the back and cover this region. It never invades the face, and rarely the limbs. Phytosis versicolor is said to be contagious, and it is reasonable to suppose that it may be so.

The affection is produced by the development of a fungus whose spores and mycelium are infiltrated among the horny cells of the epidermis. The fungus has received the name, microsporon furfur, and was discovered by Eichstedt in 1846. The spores are as the name implies, exceedingly small, but of varying size, and uniformly round; the mycelium is sometimes simple, and sometimes branched.

TRICOPHOTOSIS.

This includes inflammation resulting in either,	1, Tinea Circinata. 2, Sycosis Parasitica. 3, Tinea Tonsurans. 4, Eczema Marginatum. 5, Onyclomycosis.	From the presence of the Tricophoton.

The discovery of this fungus is probably due to Gruby who

first indicated its presence in connection with Herpes Tonsurans and Mentagra in two memoirs read before the Academy of Science of Paris, but the first thorough description was given by Malmsten, a Swede. This fungus like the Achorion Schoenleinii consists of spores and mycelium. The spores are mostly round and much smaller than those of the achorion, and the mycelium is not usually as abundant nor as luxuriant. The favorite, in fact, special seat of the growth is in the hairs and hair follicles, and to a very slight extent among the epidermic cells of the surface. The five varieties of Trichophytosis present certain common features. They are all contagious, and may be transmitted from one person to another, from man to certain animals, and from certain animals to man. A given variety may produce its like, or on the other hand, either of the other varieties, and several varieties may co-exist upon the same person. The trichophyton never gives rise to Favus, nor the Achorion Schoenleinii to Trichophytosis, I have called attention to these parasites Achorion Schoenleinii — Microsporon Furfur Tricophoton distinct species as illustrating the value of the Microscope as an instrument of precision.

COMMERCIAL FIBRES.

BY LOUISA REED STOWELL.

COTTON consists of the down or fine cellular hairs attached to the seeds of plants belonging to the germs *Gossypium* and to the natural order *Malvaceæ*. It is indigenous to all of the intertropical regions. These plants supply the raw material for one of our greatest industeries, and for the clothing of all nations, and certainly may claim a recognition among the most valuable of nature's production.

The cotton plants cultivuted in the new and in the old world constitute the two great divisions in the commercial cottons and are known as the Oriental and the Occidental, or the Indian and the American cottons. The seeds of the Indian cotton are never black and are always covered more or less with epidermal hairs, and the curvature at the base of the leaf lobes is compounded of two opposite curves, and not purely heart-shaped as in the case of the American plant. "The cottons most in demand among manufacturers of the world, are those of America. The Sea Island plant in tne soft

maritime climate of the low-lying islands off the coast of Georgia, where frost is scarcely know, has surpassed all other descriptions of cotton in the strength, length and beauty of its staple."*

The stalks of the cotton plant are made to answer some valuable purposes. Besides being used for thatch and basket, a fibre is obtained that can be converted into various kinds of cloth, equal to those manufactured from jute. Thus we have a kind of linen goods made from the cotton plant. Paper is manufactured from the stalk and leaf of the plant.

Cotton hairs are woven into a very great variety of fabries, more than is imagined by the most of persons ; for about two thousand different samples of cotton goods have been reported.

Cotton hairs are readily distinguished under the microscope from any other fibres. They are long, several times longer than the diameter of the field—unicellular, flat, but with thickened edges, so that frequently one would say the sides of the fibre were concave rather then flat, always with more or less of a twisted appearance. The fibres of cotton, having only a single layer of cellulose for their cell walls, are easily collapsed. While the cells of linen and of all kinds of fibre consisting of a liber structure are cylindrical or nearly so. When cotton hairs are growing they are full of protoplasm, as soon as they become ripe however the protoplasm is absorbed and the thin delicate walls unable longer to retain their youth and fullness become wrinkled and collapsed looking very much like a twisted bit of old ribbon. Any one can see how the cotton hairs look when they are ripe and ready to be gathered, before they have reached the manufacturers hands, by examining the cotton from our common cotton batting, or by examining the hairs on the surface of the leaf in the white foliage plant called " dusty miller."

Linen comes from the inner part of the bark of the Flax plant *Sinnm*, and is cellular in structure. There is a central opening running the entire length of the fibre. It sometimes is not possible to see it all the way without treating the fibre with some reagent to bring it out. The cell walls are much thickened by secondary deposits and are tougher than ordinary wood fibre. The firm consistency of the walls keeps the fibres full and round so that linen is never found collapsed like cotton. Occasionally the cells are pointed but

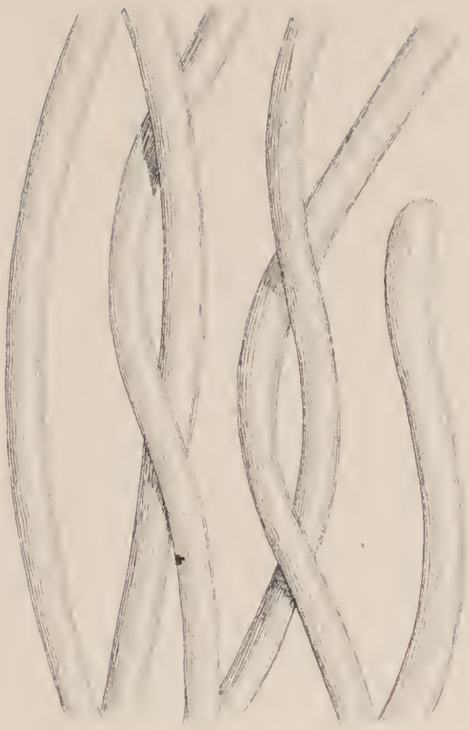
*Isaac Watts, Chairman of the Cotton Supply Association, Manchester, Eng.

generally the ends are square. Sometimes the cells are of nearly the same length as their breadth, though generally much longer. The secondary deposits on the cell wall are quite uneven, so that some cells have a much larger central cavity than others, and occasionally a cell wall will be exceedingly thickened. These layers of cellulose peal off in strips giving a rough appearance to the surface. When boiled in potasic hydrate or treated with the stronger acids faint spiral markings appear on the cell walls. Jute, flax and hemp are very similar though coarser than linen.

The individual cells of jute are rather longer than those of linen. Generally of a greyish-brown color appearing like dead cellulose. Quite a prominent central cavity with smooth edges is present, seeming to be perfectly empty. Much more uniform than in linen. It is apt to break straight across when broken at the ends of the cells, but breaks with a long fibrous fracture if broken any where in the middle of the cell.

The fibres of silk are long, slender and rod-like, with occasionally one having a flattened side. When broken the ends separate with a straight or a smooth fracture. They are solid having very much the appearance of glass rods, no cells, no central opening, no structure whatever. Averaging 1–1600 of an inch in diameter, though some are even 1-800 of an inch in diameter. Their average size is the smallest of the commercial fibres. They have a clear, white color when unstained, and are semi-transparent, and highly refractive.

Wool fibres are either cylindrical or oval. The surface of the fibre is covered by minute cells lying one upon another like shingles on a roof, or like scales on a fish, though each scale is bordered by a waving line. The value of wool for felting depends on the proportion and size of these epidermal cells or scales. Wool fibres are remarkable for their softness, flexibility and wavyness. These cells are most beautifully seen in white hairs, that have been thoroughly soaked in oil of turpentine, and mounted in Canada balsam. Soaking wool fibres in a solution of soda will separate the epidermal cells or scales from the rest of the fibre. Hairs of some animals polarize light. An interesting object of this kind may be made by placing two series of white hairs of a horse in Canada balsam so as to cross each other at an angle and viewing them by polarized light.



SILK.

COTTON.

LINEN.

WOOL.

Commercial Fibres x 370.

The fibres of cotton and linen are not effected by water, alcohol, ether, benzol or any weak solution of the acids or the alkalies, not even when raised to the boiling point. But strong solutions of either acids or alkalies when applied with gentle heat will slowly destroy the fibres.

A simple test is the brilliancy of the coloring matter taken by the different fibres, for the aniline dyes give a strong permanent color to silk and wool, while in cotton it is merely surface color and easily washed out.

If you are called upon to examine a piece of dress goods, or any material in which the presence of foreign fibre is suspected, take a small piece of the goods and boil it for a few minutes in a solution of soda (ten parts of soda to ninety parts of water). It desolves the silk or wool fibres and leaves the cotton or linen uneffected. It is possible to estimate very nearly the proportion of the mixture of the animal and the vegetable fibres, by filtering carefully the residue and comparing with the known amount taken. If the alkaline filtrate be treated with the acetate of lead the silk will give a white percipitate and the wool a black percipitate.

Wool contains a certain amount of sulphur—silk being entirely free from it. This gives us another means of detection. In a solution of plumbate of soda, wool becomes black while silk is not effected.

Correspondence.

University at Lewisburg, Pa., April 23, '81.

Prof. C. H. Stowell, Dear Sir:—An interesting little fact came to my notice several months ago, which perhaps might be of interest to some of the readers of The Microscope. Last January I discovered in an old waste-bottle in the Chemical Laboratory, quite a large growth of protococcus plurialis. This bottle had never been used except for distilled water, and was kept carefully corked. On examining a larger bottle into which the distilled water was placed after being drawm from the carboil, I discovered its presence there also. As I had placed the water in the bottle, and had used such measures as I could for securing perfect absence of foreign matters, the fact seems only to be explained by some impurity in the carboil. To add to the interest the bottles were kept in a cold room during the severe weather, and still the protococcus did not seem to be further affected than taking on its resting state would indicate. The growth seemed, at present, to have been resumed.

Yours respectfully,

W. F.

Flat Rock, Mich., April 19, '81.

Chas. H. Stowell, M. D., Prof. of Microscopy, U of M.

Dear Doctor:—Last year while I was with you in the P. Laboratory, I was considerably troubled to get cells from the Brunswick black to harden—it would generally take a week, and then not always good. Last Summer I was with some painters who were using an alcoholic solution of shellac and I tried some for a cell and found them first-rate. I take a very heavy solution for cells, make the cells on the slides, and put it on my lamp stand and heat it very hot and then let it cool. I can prepare and harden ready for use in twenty minutes. These cells I find excellent for mounting in glycerine.

Please try and report to me what success you have.

Respectfully yours,

John H. Lobdell, M. D.

CHICAGO, Ill., April 27, '81.

PROF. CHAS. H. STOWELL :—

In order to stimulate more interest in the study, and greater efficacy in the practical working of microscopy, Mr. W. H. Bulloch, of 126 South Clark Street, Chicago, offers an annual prize of $50 for five years, in the form of a microscope stand, to the student from any of the chartered colleges in Chicago passing the best examination in theory and practice of microscopy at the time of his graduation, said prize to be awarded on competitive examination conducted by a competent committee of microscopists.

The following gentlemen have consented to act as examining committee :

Prof. I. N. Danforth, M. D., Rush Medical College.

Prof. Charles Adams, M. D., Chicago Homœopathic College.

Prof. Lester Curtiss, M. D., Chicago Medical College.

Prof. E. S. Bastan, A. M., Chicago University.

Mr. E. B. Steward, Cor. Sec'y Illinois State Microscope Society.

It is to be hoped that the enterprising classes of each institution will furnish candidates to contest for this prize.

E. P. MURDOCK, M. D.
Curator Rush Medical College.

DRUG ADULTERATION.—A very important report on drug adulteration in America is made by Mr. C. Lewis Diehl to the National Board of Health. His report gives tasteless, exhausted aconite root ; arnica with but ten to fifty per cent. of the true root ; hydrastis containing fifty per cent. beet root, serpentaria, sanguinaria, and podophyllum. Sarsaparilla adulterated with nutgalls, ipecac, matico stems, paper, bark, belladonna and digitalis hairs. Whole peppers were acorns "turned" into small globes and dyed. Peppercorns made of oil cake, clay, and cayenne. Pepper of light weight macerated in brine to increase weight. Ground pepper—pepper leaves, sage, rape, potato, spices, capsicum, guinea pepper, chicory, laurel leaves, olive stones, bone dust, dirt. Quinine—finely picked cotton, salicene. Santonin—mica, boracic acid twenty-two per cent., picric acid 100 per cent. (all picric acid, no solution.) Ships biscuit enter into the following : cape aloes, ipecac, opium and gamboge, twenty-five to fifty per cent. Scammony contained ships biscuit, cocoa beans and lamp black. An examination of a number of specimens of ground nux-vomica obtained in this city showed freedom from adulterations.

E. E. G.

Editorial Department.

IT WILL DO FOR BABES.

IT IS a happy fact that we are not all constituted alike; for while some people are always suited and see good in everything, others are exactly the reverse. The members of the last class have a dark outlook, for the present is unsatisfactory and the future full of trouble and disappointment. These people are always unhappy, for when they most desire the hen to do her part toward providing the daily bread, she is sure to set; and ducking, swinging, tying, a dark box, a pan of water, all these only tend to aggrivate matters, and at last the old hen is allowed to set in peace trying to hatch a brood of Cochins from a cobble-stone.

If this hen, having left her nest for food, should chance to meet a sister hen scratching away for the good of a fine chick, we fancy she would turn away in disdain and would mutter to herself thus; "The idea of that hen's making such a fuss over that chicken! Its legs are crooked! It hasn't any fine feathers! Cant walk straight! Cant cackle or crow! Just wait until my chicken is hatched and I'll show you!" But a favorable opportunity will never come for that old hen's cobble-stone to become transformed into a chicken, and while she is croaking away, the producers are bring in the results. You may call us the "old hen" if you please, but bear in mind that this journal is our one chick.

The other hen exactly represents to our minds a certain physician who thus expressed himself to a friend of ours:

Friend. Have you seen "THE MICROSCOPE?"

Doctor. Yes.

Friend. Have you subscribed?

Doctor. No! And do not intend to either.

Friend. Why, dont you like it?

Doctor. Oh! *It will do for babes.*

The doctor evidently does not like our crooked-legged featherless chicken, but if he is not careful, the food our chick is getting already, in the way of communications and dollars, is such that one of these days it may actually flap its wings and crow.

The doctor understood our ambition better than he thought when he said our work "would do for babes." We have no desire to lend the columns of this journal to those persons who take delight in discussing those microscopical problems which result in good to the few only. To understand the handling of high powers, to be able to resolve difficult tests, to know a great deal about "angular aperture," all these are desirable, though as private workers they may interest us personally, yet we positively declare they are not the things this journal hopes to make more clear. The prominent idea we wish this journal to convey is, that "expert" work is not necessary in order to get satisfactory results from the use of the microscope in medicine and pharmacy. We know that for the money, time and labor given, nothing can bring the physician or pharmacist better returns than the microscope.

Some men, like the author of the sentence at the head of this article, take delight in conveying the idea that it is a truly wonderful thing to be able to use a microscope, no results only from long experience, only a few can ever learn to use the instrument, etc. We shall have occasion, again and again, to disabuse our readers of this idea. A few hours reading will start any man on the right road to the successful examination of the secretions and excretions of the body. The catalogues of our advertisers will show that for fifty dollars, even less, an instrument can be purchased with a one inch and one-fourth inch objectives of sufficient quality to do ordinary work, hence the price cannot be the great drawback. To be sure we may belong to the "babes" for a time, nevertheless the solid results will come in at once and we will be able to write "value received" over the bill for the microscope before the "thirty days" have expired. We intend, then to fill the columns of this journal with matter that shall prove the practical value of the microscope to physicians and pharmacists, and as the theoretical will be avoided to a large extent and the practical made as prominent as possible, we shall be happy in remaining one of the "babes."

IT is certainly very sad that our friend of the *Herald* cannot even read correctly. Now see here, brother J. B. M. you say you read our salutatory carefully, then just point out to us where we say, "We do *not* believe, however, that we are pioneers, etc." That little

negative sounds bad to our pine-ears, and makes us say just what we do not mean to say. But then it is a grand thing to be able to see a negative (in the right place).

If our "nasal protuberance" does get "badly mashed" we have this to console us, first, that a goodly share of the most objectionable part of our physiogomy would be forever ruined, and second, that the general devastation would be consummated by our own spontaneity.

WE have had the pleasure of a visit from Mr. W. H. Walmsley, who is the R. and J. Beck of America. Mr. Walmsley tells us that they are selling more microscopes than ever before, and although the works in London are running extra time still they have orders for weeks ahead. Their catalogue is filled with every needed accessory and also contains a description of the various microscopes of the firm. Mr. Walmsley tells us that their "Economics" are meeting with great favor. We examined two of their large "Internationals" while at Jackson a few evenings ago and were much pleased with their fine finish. Mr. Reynolds, of the Griffith Club of Microscopy, and Dr. Catlin, of Tecumseh, are agents for these goods also. For their addresses see our advertising pages.

The "Investigator" of Bausch & Lomb, is getting quite a start. It is capable, certainly, of doing and allowing some things not possible in their other patterns. They claim for it that "it has reached a higher degree of perfection than is possessed by any one approximating it in price." It will pay our readers to send for a catalogue and read of this new instrument.

WE give extracts from a number of letters we have received on another page, and we improve this opportunity to thank our new friends for this encouragement, which has not been all wind, but has in each case been accompanied with the necessary dollar, and in many cases with extra dollars, also. Yet at this writing we are not able, conscientiously, to asssert that "our circulation is the largest of any journal in this country," still we do not know what a day may

bring forth, and so we stand prepared to add a large number of names to our list, and we ask again of each of our readers to assist us by forwarding the names of those persons who either own microscopes or expect to own them sometime. Just write the address on a card and send it along. In this way, largely, must we hope to get our journal before the public before the end of the present century.

WE take pleasure in presenting to our readers a lithograph of the character of this one illustrating the "commercial fibres," and in our next issue we promise a full page lithograph of the triple-phosphates, the drawings by Mrs. Stowell from actual specimens, and the engraving by the Detroit Lithographing Co. The article will be written by Dr. Geo. F. Heath of Missouri.

An article will also appear by Prof. Lobdell, subject: "From Cartilage to Bone as Seen by the Microscope."

ONE of our advertisers has informed us that in less than two weeks after our first issue appeared, he had received as many letters in answer to his "ad" as he expected to receive from three issues, and that already his profits from it had more than paid all expenses, with five paid issues to hear from.

DOES COOKING DESTROY TRICHINÆ?

M. VACHER, of Paris, affirms that the ordinary cooking of a joint of meat is not sufficient to destroy these parasites. He submitted a leg of pork of moderate size to thorough boiling. A thermometer at a depth of two and one-half inches, after a half hours boiling of the meat, registered 86° F. After one hour's boiling 118° F., and after two and one-half hours boiling 165° F. Yet he declares this heat insufficient. He says that "trichinæ would almost entirely escape the action of boiling water" in cooking.

Editorial Abstracts.

SANGUIS BOVINUS EXSICCATUS.

IN the May number of the *Therapeutic Gazette* Dr. Seiler gives a novel method of using this dried blood. Instead of giving it by the mouth or rectum he caused the patient to inhale a solution of the blood to which a little morphia had been added. The solution was inhaled from an atomizer. By desolving the dried blood in neutral salt solution numerous restored blood corpuscles were seen.

TONSILLITIS.

IN the early stage of this painful affection a mustard emetic many times acts like a charm, producing immediate resolution. Should the emetic fail warm inhalations should be employed, also hot poultices below the ears, small and frequent doses of belladonna internally with plenty of liquid food. An early puncture of the inflamed tonsil is recommended, gargling hot milk and water to encourge the hemorrhage. Others have recommended early scarifying the tonsils and then using ice freely both externally and internally.

WHOOPING COUGH.

DR. Copenden testified in the *Therapeutic Gazette* to the use of chestnut leaves in whooping cough. He prescribes one drachm doses or less (according to age) of the fluid extract of ustilago maidis, every two to four hours, and confidently expects a cure inside of a week. It is given in sweetened water. Inhalations of turpentine have been used successfully in several cases. Dr. Baretz, of Nice, reports several cases. Open dishes of turpentine are placed in the corners of the rooms where the patients sleep. The air is renewed twice a day.

ETHYLATE OF SODIUM.

DR. BENJ. W. Richardson of London uses this preparation with marked success is removing diffused nævi, tattoo marks, etc. By applying it to the pedicle of a nasal polypus, the growth, a small one, was removed at once by blowing the nose. Larger polypi have been removed by two or three applications. In ozæna and lupus he reports most excellent results.

CITRIC ACID FOR IMPURE WATER.

DR. Langfeldt has made a series of experiments which show that one part of citric acid in 2,000 parts of water containing animalculæ will, in about a minute, cause the death of the animalculæ, after which they settle to the bottom of the vessel. The solution should be fresh.

PAMPAS GRASS.

THIS wonderful western cereal, which is commonly called Pampas grass, according to the Philadelphia *Trade Journal*, contains more starch and less oil than corn, which renders it valuable as a malting agent, and the Western brewers are going to use it in the place of barley.

HOT WATER IN TETANUS AND TRISMUS.

CASES of tetanus have been reported cured by merely applying to the nape of the neck and along the spine large pieces of flannel dipped in hot water of a temperature just bearable to the hand, (50° F. 55° C).

Selections.

METHODS OF HARDENING MATERIAL FOR MICROSCOPIC SECTIONS.—It is the object of the present paper to point out briefly, a few hints which may be serviceable in the manipulations and preservation of morbid growths in connection with their microscopical examination, in order to determine correctly their histology. I may at the outset remark that it is impossible to make a microscopical examination of any tissue or organ which has not been submitted to a process of hardening, and that this process usually requires from eight to ten days, according to the nature of the tissue and the character of the regents used. I deem this remark necessary, inasmuch as I frequently have had very excellent medical practitioners leave me growths or large tumors to examine microscopically, and call next day for results. I will consider the best means for hardening the various growths according to their positions, or the tissues with which they are connected.

Morbid conditions of the skin, including growths from subcutaneous tissue which invade the rete malpighii, epithelioma, etc., of skin. For these growths I find the best fluid for general use is methylated spirit. Dilute spirit in the proportion of two parts spirit, to one part water being employed for the first three days, and then the fluid changed, and ordinary methylated spirit substituted. When I say the tumor is to be placed in spirit, I do not mean that a large mass of epitheliomatous cancer is to be simply thrown into spirit and left there for a week, but that the growth must first be cut into pieces about one inch square and these placed in the spirit—this is to allow the fluid to permeate all parts of the tissue, and thus preserve them in an equal degree of freshness; this is an important step and one usually forgotten.

I remember on one occasion having had sent to me by Dr. Hughlings Jackson, an adult human brain, where death had taken place during an attack of chorea—the object being that the corpora striata and optic thalami might be searched for embolism. The brain was preserved entire in spirit, the result of the preservation being that the central parts were all rotten and hence a very valuable specimen lost. If a small portion only of a tumor is kept for exam-

ination, take a fair piece, not merely a thin slice from the surface or bottom, but a portion about three-fourths of an inch in thickness, extending from the peripheral part of the growth to the centre so that the histological conditions of the various parts of the growth may be studied and also its method and area of invasion. For very hard subcutaneous growths, such as scirrhus tumors of the breast, and chronic inflammatory masses, where we wish to study the relations of the rete. Malpighii to the growth, I prefer a very dilute solution of chromic acid, say one-sixth or one-tenth per cent. in water, as this causes less shrinkage then the methylated spirit, and renders the sections less brittle, and also does not interfere with their staining, since a section which has shrunken under the action of spirit will not take staining fluid nearly so well as one in which the shrinkage is not so great.

For pathological changes in the alimentary canal, I prefer a mixture like the following,—one part chromic acid solution of one-sixth per cent. two parts methylated spirit, and one part water. The material should be left in this fluid for five or six days, the fluid being changed occasionally in the mean time.

For pathological changes in the liver, I prefer a solution of chromic acid of one-sixth per cent. and the material may remain in the solution for six or eight days. For pathological changes in the kidney I use a 5 per cent. solution of mono-chromate of ammonium, and leave my material in solution for eight or ten days. For showing pathological changes in connection with the brain and spinal cord the best hardening fluids are either a two per cent. solution of potassium bichromate or ammonium bichromate.

After taking any material from any hardening fluid it is generally necessary to leave it for an hour or two in clean water, and when chromic acid or chromates have been used it may be necessary to leave it six or eight hours in water, until it is washed free from the yellow color which is imparted to it from the acid. The pieces are then placed in absolute alcohol for ten or fifteen minutes and are then embedded.

For embedding I use equal parts of white wax and olive oil. * * * *."—Dr. C. Beard, in the *Canada Lancet.*

Carbon and the Germ Theory.—In an interesting article on the above subject, in the *American Monthly Microscopical Jour-*

nal, Dr. D. E. Salmon argues strongly in favor of the germ theory of disease and attempts to prove the identity of the virus of carbon is a bacterium. He offers the following propositions in support of his argument:

1. Blood and pieces of spleen, or lymphatic glands, if dried as soon as possible, after the death of the animal, soon lose their activity—the smaller particles in twelve to thirty hours, and all within five weeks. When their inactivity is proved by inoculation, cultivation-experiments show that the *Bacillus* has perished.

2. Such pieces of spleen, or glands, which have been dried, slowly, in a warm room, may retain their virulence for, certainly, four years. These are found to contain spores, which may be cultivated, and which grow into filaments that again form spores.

3. If a bottle, or test-tube, is filled with carbon blood, tightly corked, and placed in an incubator at 35°, it very soon has an extremely disagreeable odor of putrefaction, and, within twenty-four hours, the rods have disappeared, and the fluid is no longer capable of producing the disease when inoculated. This is, evidently, due to the absorption of the available oxygen by the septic bacteria, as may be rendered clear by the next two paragraphs.

4. If a drop of such carbon blood is placed on a slide, and covered, and the cover cemented air-tight, the rods grow until the oxygen is exhausted, as shown by the spectroscope, they then remain stationary, and, in a few days become granular, and disintegrate without forming spores. Such blood is no longer capable of producing carbon.

5. If the carbon blood be placed in a watch-glass where there is free access of air, and then kept in an incubator at a proper temperature, the putrefaction goes on as before, and swarms of micrococci and bacteria appear. The development of the *Bacillus anthiacis* is accomplished, however, as though no other organisms were present, the spores are formed, and sink to the bottom, and inoculations produce the disease for a long time afterward (at least twelve weeks, as shown by experiment.)

6. When substances containing the *Bacillus* rods, alone, are somewhat diluted with distilled or well-water, the development of the rods is not stopped; but, if the dilution is excessive, the organism is soon destroyed, and, after thirty hours, inoculations fail to produce the disease. That is, the actively-growing organism re-

quires a certain concentration of the nutritive fluid, in order to accomplish the spore-formation.

7. If flakes, containing spores, are taken from a watch-glass (paragraph 5, above), containing putrid, but still virulent blood, and, placed in a test-tube, full of distilled water, the virulence is not destroyed, but is retained for weeks unchanged.

8. Such flakes may also be dried, and, after a certain time, moistenen with water, and again dried, and this repeated, indefinitely, without destruction of the virulence.

9. A watch-glass of fresh carbon blood, placed in a room at 8° (46.4°F.) remains virulent for only three days. The rods, at this time, have not formed spores, and show the granular, disintegrating appearance which indicates their death.—J. B. M., in *Medical Herald.*

On the Grains of Silica and Micrococci of the Atmosphere.—At the period of the great debate on spontaneous generation between M. Pasteur and Pouchet, the latter was the first to draw attention to the fact that some of the minute spherical granulations discovered by the microscope in dust deposited from the air in various regions of the globe, were essentially composed of silica.

That they had often been mistaken for eggs of infusoria or for micrococci was very evident; but when the dust was submitted to complete calcination in a platinum crucible the same grains were still visible, with the same forms and dimensions as before.

There is no doubt that the dust of the atmosphere reveals to the microscope, besides the larger mineral fragments mostly of an angular shape, exceedingly minute spherical or circular bodies, being often not more than 0·001 of a millimetre in diameter, and very similar in size and shape, which resist the action of a white heat in contact with the air, and that of strong hydrochloric acid. In some of my observations they were remarkably numerous. Both before and after the action of heat they are more or less transparent. What can be the origin of these singular objects?

The same experiments repeated with siliceous algae, such as those belonging to the large family of the *Diatomaceæ* and with the

micrococci of impure water or vegetable infusions, showed me that they do not retain their forms after being subjected to the above treatment, and that in many instances they can be totally destroyed by heat on the object glass itself. On the other hand, the fossil diatoms resisted the action of heat and acids and retained their forms. I can only draw one conclusion from these observations; namely, that the minute siliceous bodies found in the atmosphere are also fossil, they are micrococci of another age.—Dr. Phipson, in *Chemical News.*

The Specific Agent of Typhoid Fever.—Prof. Klebs, of Prague, believes that he has discovered the micro-organism which constitutes the specific agent of typhoid fever, and develops his views in a paper entitled "Der Ileotyphus eina Schistomy cose," published in the *Archiv fur Experimentale Pathologie*, t. xii. p. 231, 1880. Prof. Klebs has for a long time, assisted by his pupils, been making researches in that direction. He writes that he has been able to find at the necropsy of twenty-four persons carried off by dothinenteritis, microbes in various organs: in the intestine mucous membrane, in the thickness of the cartilages of the larynx, in the pia mater, in the foci of lobular pneumonia, in the mesenteric ganglia, in the parenchymata of the liver, and generally diffused in the organs which showed the most decided lesions. These micro-organisms showed themselves in the form of rods, about eighty micrometers in length and 0.5 to 0.6 micrometers in thickness. They have been constantly observed in the bodies of dothinenteric patients since the attention of Prof. Klebs was drawn to the subject, and they are always absent from the organs, and especially the intestines, of subjects who have died from any other disease than typhoid.—*British Medical Journal.*

SCIATICA.

Dr. Smythe, Dr. Comegy, and Dr. Dacosta have each recommended hypodermic injections of $\frac{1}{16}$ grain atropia, three drop doses of sulphuric ether, and deep injections of chloroform near the seat of pain.

Items.

A "great composer"—chloroform.—*Ex.*

"Music on the brain."—Quiniæ Sulphas. grs. xx.

The dogs of war in South America continue to raise their Peruvian bark.—*Ex.*

One factory in Buffalo turns out 100,000 pounds of oleomargarine per week.—*Ex.*

A sick man is considered out of danger when the doctor discontinues his visits.—*Ex.*

The small-pox is reported as raging in Ireland. After this the Irish people will be more pitied than ever.—*Ex.*

Now that measles are prevalent, mothers as well as astronomers are looking for spots on the son.—*Harvard Lampoon.*

The price of human hair has advanced to such a figure that jute is now used for ornamentation to the manufacture of oleomargarine. This is a world of deceit.—*Argo.*

A Paris manufacturer claims to have discovered a process for substituting the leaves of the eucalyptus tree, which in burning emit a delicious perfume, for tobacco leaves in making cigars.—*Ex.*

Europe seems unnecessarily agitated over trichiniasis but then she has had one Diet of Worms and does not care to repeat the experiment.—*Boston Transcript.*

Mrs. O. Leah. Margarine has arrived in the city. Her friends think her the *creme de la creme*, butter enemies think differently.—*Washington Republican.*

The New York assembly has passed a bill requiring boarding-house keepers who use oleomargarine to display a placard in the dining-room announcing the fact.

A public laboratory has been established in Paris by the Prefect of the Seine for the analysis of anything sold as food. The fees are limited to from five to twenty francs, according to the difficulty of the work to be done.—*Provisioner.*

In order to distinguish genuine butter from so-called oleomargarine, Hagar advises saturating a cotton-wick with the melted sample, lights, and allows it to burn for two minutes or so, and judges its quality by the smell. Artificial butter gives the well-known offensive smell of an extinguished tallow candle.—*Provisioner.*

"May we hope for the pleasure of your company at our soiree to-morrow, doctor! We shall have a little instrumental and vocal music. My daughter Alice will sing, and afterward Beatrice will recite her new poem. At 9 o'clock we shall sup." Doctor. "Many thanks; you are very kind. I will be with be with you at 9 sharp."

An ignorant candidate for medical honors having been thrown almost into a fever from his incapability of answering the questions, was asked by one of the censors how he wonld sweat a patient for the rheumatism. "I would send him here to be examined," he replied.

Paralysis, which we all know is on the increase, and indeed is increasing to an alarming extent, is considered by the best scientists of the age to be mainly due to the poisons that we take in our food and drink. Poisonous adulterations find their way now-a-days into every article of food that passes through the hands of the manufactures.—*Ex.*

A yankee physician was lecturing lately on the ignorance of people of their own complaints, and said that a young lady once asked him what his next lecture would be upon, and being told the "Circulation of the Blood," replied that she should certainly attend, for she had been troubled with the complaint for a long time.—*Advocate.*

Street Scene in Philadelphia.—A crowd attracts Dr. Chapman's attention: he draws up and, recognizing one of his pupils, hails him and enquires: "What's the matter?" "Ah, doctor, I

am glad to see you. A young lady has fallen and sprained her ankle." "All right, set it;" replied the doctor, "but don't get above your business."—*Ohio Medical Record.*

The latest device, which is reported to be getting alarmingly common in some parts of the Dominion, is the preparation and sale of "galvanized" butter. This interesting article of merchandize is made in rolls, the outside of which are of the primest product of the dairy, plastered on in thin layers over huge lumps of lard, sheep's fat, etc., of the poorest quality.—*Post and Tribune.*

Prof. Chandler, of N. Y. City, in obedience to a resolution of the aldermen, reported to the Board of Health the result of his inquiries into the subject of oleomargarine. He says that it is superior in all respects to the poorer grades of dairy butter sold here; that there is nothing objectionable either in the material or its manufacture, and as there is nothing unwholesome in oleomargarine he sees no need of legislation in regard to it to protect the public health.—*Ex.*

Cheap Microscopes.—Speaking of the importance of the microscope to physicians, the neglect of medical schools, and to provide proper instruction in its use, the Philadelphia *Medical and Surgical Reporter* says, that "The needed facilities are not necessarily expensive. Simple instruments, costing not more than $50 or $60, do all the work at Strasburg, Wurtzburg, and other German schools." We are glad that microscopes are getting cheap, and trust the day is not far distant when every apothecary, as well as every physician, will have one of these instruments.—*Druggist.*

Young microscopists in preparing their beautiful diatoms for the slide find it very difficult, if not impossible, to rid them wholly of dirt and flocculent matter. The usual process of washing them with nitric acid and bichromate of potassa leaves them still quite obscure. The Hon. H. L. Smith, of the Royal Microscopical Society, cleans them perfectly by putting them back into the test tube after completing this process, with clear, soft water and a bit of common yellow soap, of about the size of a pea, boiling them, and washing two or three times afterward with clean rain-water.—*Ex.*

An insight into some of the qualities of volcanic force is given by Mr. Wymper in a lecture on his ascent of Chimborazo and Cotopaxi. In an eruption of Cotopaxi, which he witnessed, the ashes rose in a column twenty thousand feet above the rim of the crater, which was itself nearly twenty thousand feet high, and spread over an area of many miles. On a microscopic examination the fineness of the ashes was found to vary from 4,000 to 25,000 particles to the grain in weight. From observations of the area over which the ash fell, Mr. Wymper calculated that at least 2,000,000 tons must have been ejected in this one eruption.—*Ex.*

Microscopic Revelations.—As an illustration of the value of a great many of the so-called discoveries, or revelations, made by the microscope, we wish to call attention to the fact that a medical gentleman, well known in Louisville, several years ago, was engaged in the study of the appearance of the blood-cells from his own body. He noticed that all the cells appear to be elliptical in form, that the extremities, in the long diameter, were not sharply defined, wherefore, he concluded that the blood-cells were not only elliptical in form, but lenticular, or bi-convex shaped. His eyes growing weary, and being the subject of astigmatism, he put on his glasses and attempted the examination of another specimen of blood, taken from a negro, when the cells appeared to be entirely round and depressed in the center. He was about to conclude the blood of the Caucasian might be recognized by its elliptical, the African by its round cells. A defect of refraction in his own eyes was solely to blame for the elliptical form of the cells seen.—*Medical Herald.*

Mr. R. Warrington has called attention to the important part which organic agents, including the "germ of decay," perform in the purification of foul waters changing organic into inorganic matter. The whole process is in effect the work of a number of independent organisms having different functions, and following one another, each of which carries the operation through a particular stage. First, the fungi produces a rapid oxidation of carbon; then the bacteria, of many kinds, and having different actions, liberate nitrogen in ammonia from nitrogenous organic matter into inorganic carbonic and nitric acids.

Lastly, the chlorophyll-bearing plants consume products of the lower organisms, and having also the property of assimulating urea and inorganic ash constituents. Sewage will finally be destroyed in a river of adequate temperature,unless the natural agents of oxidation are excluded by the addition to the water of chemical refuse fatal to organic life, or unless vegetation is prevented by artificial means.—*Ex.*

How to Detect Glucose.—The proportion of glucose added varies from twelve to twenty parts per 100, and there are very few fancy sirups or sugars in the market that are not indebted to the corn crop for their beauty and comparatively low cost. Aside from elaborate scientific tests, the means of detecting this adulteration are very simple. Being less soluble than sugar the glucose settles at the bottom of the cup, unless the hot tea or coffee is persistently agitated, and when left to dry forms a hard, horny film, similar to dried gelatine, but a little more readily scraped or cut. Upon the surface of sirup thus aduiterated a film or pellicle forms upon exposure to the air. The pellicle is of extreme thinness and tranparency, but becomes corrugated when the exposure is prolonged,and possesses a considerable degree or resistance to rupture. A lens is not necessary to its detection and study. These are very simple tests, but they are capable of detecting a very minute per centage of the adulterant.—*Science Gossip.*

Microscopic Examination of Blood.—The characteristic distinctions of human blood and those of the blood of other animals are thus set forth in No. 2 of *L' Orosi* by Dr. Vincenzo Pesetty Cervera, and if other physiologists will take the pains to varify his work, they may play a very important part in medical jurisprudence. When blood is mixed with a little bile, small crystals not over 0.003 of a metre in size are formed ; but these crystals the doctor says, will show whence the blood had come. If from man, the crystals will be rectangular prisms ; if from the horse, they will be cubes ; if from the ox, they will be rhombohedrons ; if from the sheep, they will be rhombohedric tablets ; if from the dog, they will be rectangular prisms, closely resembling the human forms ; if from the rabbit, they will be tetrahedrons ; if from the squirrel, they will be hexagonal tablets ; if from the mouse, they will be octahe-

drons ; and if from common poultry they will be cubes more or less perfect. There would seem to be room for more acurate research in this direction.—[We should say so.—Ed. Bistoury.] [We should say so twice.—Ed. The Microscope.]

In liquids small particles often show dancing motions under the microscope, and similiar motions have been attributed to dust particles in air, and accounted for by the shock of molecules with the particles. In a recent paper treating fully of the movements of very minute bodies, Herr Nägeli calculates from data of the mechanical theory of gases as to the weight and number and collisions of molecules, the velocity of the smallest fungus particles in the air that can be perceived with the best microscopes, supposing a nitrogen or oxygen molecule to drive against them. It is, at the most, as much as the velocity of the hour-hand of a watch, since these fungi are 300 million times heavier than a nitrogen molecule. The ordinary motes would move 50 million times slower than the hour-hand of a watch. Numbers of the same magnitude are obtained for movements of small particles in liquids. In both cases a summation of the shocks of different molecules is not admissable, as the movements are equably distributed in all directions. Herr Nägeli therefore disputes the dancing motion of solar dust particles, and attributes the Brownian molecular motion to forces active between the surface molecules of the liquid and the small particles; but he does not say how he conceives of this action.—*Stoddart's Review.*

Last evening, at the Conversazione of the Chemical Society, I showed how easily the adulteration of sugar by starch-glucose, can be detected by the microscope.

I had two samples of coffee sugar, one being a pretty high grade sugar, and the other being of as low a grade as there is in the market; I had, besides, a sample of the starch-sugar in small grains, which is used to aduterate sugar, and also a sample of adulterated sugar, "new process sugar," so-called.

Both the samples of coffee sugar, when seen by reflected light through an A eye-piece and a $\frac{4}{10}$ objective present a beautiful appearance. Every crystal is perfectly formed and thoroughly transparent. A group of these crystals looks like a mass of rock candy.

The grains of starch-glucose are opaque and look like pieces of tallow.

In the adulterated sugar, the crystalline grains of real sugar and the opaque, amorphous grains of starch-sugar may be seen side by side with great distinctness.

I send you herewith samples of coffee sugar, also samples of starch-sugar and of the adulterated sugar, that you may see them for yourself.—P. Casamajor, in *American Monthly Microscopical Journal.*

Potato Flour.—Potato flour is in demand to a much greater extent than would be supposed. It is employed largely in various manufacturing processes, as an adulterant to wheat flour and in the manufacture of starch. When used as an adulterant to wheat flour, its province is that of increasing the bulk of bread from a given amount of flour. The starch grains of potato flour are much larger than those of wheat, and in the baking process these grains burst and occupy a much larger space than starch grains from the latter, making the loaf look larger, although not increasing the weight. A little potato flour added to the bread dough is to be recommended as producing a more porous result than that arrived at by using wheat flour alone. But when carried to excess, the effect of potato flour is the production of bread containing large cavities. Pure potato flour is a glistening white flour, contrasting very favorably when looked at by the side of wheat flour. Yet, when used to adulterate the latter, it is sometimes very difficult to detect without resorting to the microscope or applying chemical tests. It is largely used as sizing, and when calcined is a valuable dressing for silk. So great has the demand for this product become, that one county of England alone consumes 20,000 tons annually. The price of the flour in Liverpool is nearly double that of wheat flour.—*Ex.*

The Swindle in Vinegar.—Some remarkable revelations concerning the adulteration of food are made in the annual report, just published, of the inspector of vinegar for the city of Boston. The total amount of the liquor sold and used in Boston each year under the name of vinegar is estimated at about 3,000,000 gallons. Of this, the inspector declares, less than one-tenth is pure apple juice,

the rest being a villainous decoction of molasses, glucose, acetic acid, sour ale, lager beer, distillery slops, etc., made for about half the lowest possible cost for pure cider vinegar. Nor is this all, nor even the worst view of the case. Such substances as oil of vitriol and other mineral acids are brought into requisition. One cent's worth of sulphuric acid is sufficient for the manufacture of four gallons of vinegar, and when disguised by other ingredients its presence cannot be detected by taste alone. Much of this wretched stuff, it is believed, has been sold in the Boston market as "pure apple vinegar." Fifteen hundred barrels of it in a single cargo were seized by the officers, and fifty more barrels were captured in a warehouse and shipped back to the former owners. The extent to which this illegal and inhuman business is carried on is shown by the fact that the wholesale price of vinegar in Boston averages nine cents a gallon, much of it being sold as low as six cents, while the genuine article cannot be sold for less than about 12½ cents per gallon. It is only natural that the inspector, in concluding his report, should attribute the high death rate of the city largely to the consumption of these deleterious compounds.—*Ex.*

Reviews.

How to see with the Microscope. By J. Edwards Smith, M. D., Professor of Histology and Microscopy in the Cleveland Homeopathic College, etc., 400 pp. Illustrated. Duncan Bros., Chicago.

No matter how bitter enemies Professor Smith may have, one thing is certain, they will never accuse him of plagiarism. The general style of the book, however, to our minds, is too much as stated by the author in the preface, "rodundant, gossipy and common-place." Of course the subject of the work is such that hardly any two practical microscopists would agree upon many of the points, yet to those ambitious to become expert manipulators of the microscope, we would say, purchase the book at once. Chapter VII contains enough to repay you.

We are glad to see the book for there is profit in it for all; from the beginner to the oldest worker, and we understand the author's ideas better than before, and at the same time more favorably.

The Human Body. By H. Newell Martin, D. Sc., M. A., M. B., Professor of Biology at Johns Hopkins, etc., pp. 621, appendix 34, with 165 figures. American Science Series, No. VII.

To the general student who is not making anatomy and physiology his special study this work will be found of great value. Written by so well known an author its statements can be taken as the latest and best on the subject. Discussions are avoided to a large extent and the best supported views given.

It will be a grand thing when more of our general students pursue works of this character. There are 36 chapters, commencing with the general structure and composition of the body, followed by the histology and physiology, of the principal organs and tissues, with something of hygiene added.

We must, however express our regrets that the "appendix" forms a part of this otherwise admirable book. The matter it contains is not necessary for the class of readers the book will have.

The Michigan University Book, 1844—1880. By Thos. R. Chase, M. A. Class of '49. pp. 400. Price, $2.00. Detroit, Mich.: Richmond, Backus & Co.

This book gives a brief biography of every name so far as known and is on the whole a reliable work. Its value to all the alumni of the University must be very great indeed. It is our only means of knowing who have been connected with our alma mater. The labor Mr. Chase has expended on this book must have been immense. It is to be hoped our alumni will appreciate it and will add their share toward recompensing the author.

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THE MICROSCOPE.

AND ITS RELATION TO

MEDICINE AND PHARMACY.

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CONTENTS.

PAGE.

Original Communications.

Use of the Microscope in Gross Anatomy. By T. B. Stowell, A. M., Ph. D..... 65
The Urinary Phosphates. By Geo. S. Heath, M. D..... 68
From Cartilage to Bone, as seen by the Microscope. By John H. Lobdell, M. D..... 72

Correspondence.

Letter from Paris..... 74
The Microscope as an Aid to Correct Diagnosis in Certain Diseases of the Skin..... 75

PAGE.

Editorial Department.

The Microscope in Skin Diseases..... 76
Editorial Briefs.....77-79

Selections..... 80

Items..... 87

Reviews..... 94

What Our Exchanges Say..... 96

Original Communications.

USE OF THE MICROSCOPE IN GROSS ANATOMY.

BY T. B. STOWELL, A. M., PH. D.

HISTOLOGY has been called one of the corner-stones of medicine. The time has passed when the value of the revelations of the microscope could reasonably be doubted. While all are now ready to admit the necessity of its use in the study of the minute structure of tissues, some are not willing to acknowledge that it is any help to the ordinary anatomist. The successful manipulation of high powers is indeed something of a task and requires special training and practice; but the use of low powers is easily learned and would often produce valuable results. The student of ordinary or gross anatomy frequently reaches the limit of research by the un-

assisted eye; and, without desiring to go far into the field of the specialist, would yet be glad to push his investigations beyond the limit he has reached. Just here the microscope comes to his aid.

A recent study of the vagus nerve and its relations in the domestic rabbit (Lepus cuniculus, Linn.) may serve to illustrate the proposition. The portion of the nerve considered was in the thoracic region between the arch of A. aorta and the diaphragm.

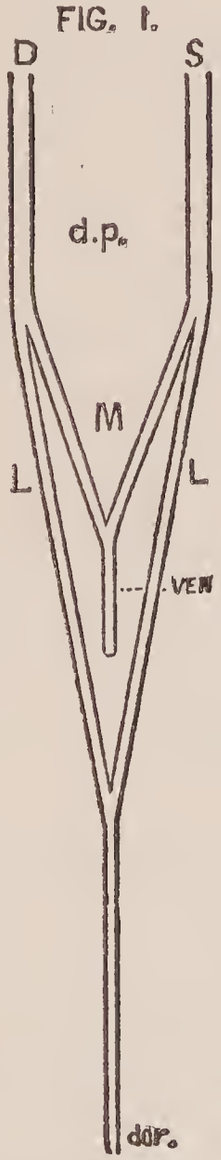


FIG. Diagram to show division of N. vagus in the cat. D, N. vagus dexter; S. N. vagus sinister; L., lateral rami; mesal rami; dor., dorsal trunk which becomes the dorsal gastric nerve caudad of diaphragm; ven., ventral trunk.

FIG. 2. Diagram to show the prevailing plan in the rabbit; nomenclature as in Fig. 1; d. p., dorso-pulmonary region; d. o., dorso-œsophageal region.

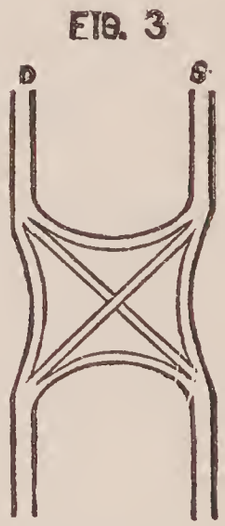


FIG. 3. Diagram of chiasmus vagus in rabbit.

The typical arrangement of this nerve is found in the cat (Felis domestica,) or the dog (Canis familiaris, Linn.). In the dorso-pul-

monary region, both on the sinistral and dorsal sides, the vagus nerve divides into lateral and mesal rami (Fig. 1, L. M.). The lateral rami reunite a short distance cephalad of the diaphragm to form a distinct nerve trunk, N. gastricus dorsalis, upon the dorsum of the œsophagus in the caudal (posterior) mediastinum (Fig. 1, dor.); the mesal rami, taking a ventro-caudal course, unite slightly cephalad of the union of the lateral rami, upon the venter of the caudo-pulmonary œsophagus to form a ventral trunk, N. gastricus ventralis (Fig. 1, ven.). Caudad of the diaphragm these gastric trunks supply the stomach, and terminal rami extend to the great solar plexus.

Such being the typical disposition of the two branches, it becomes desirable to establish the exact arrangement of the rami in the rabbit. The prevailing plan in the rabbit in the dorso-pulmonary region is as follows: The nerve trunks approach the ventrimeson of the œsophagus until they lie apposed for 5-10 mm.; in this relation N. vagus dexter divides and gives off a large mesal ramus 15-20 mm. in length which joins the sinistral trunk somewhat caudad of the roots of the lungs (Fig. 2, M); the lateral ramus continues in a dorso-caudal direction and meets the sinistral trunk upon the dorsum of the œsophagus about 55 mm. caudad. At this point the nerves form two closely apposed trunks for about the same distance as in the dorso-pulmonary region ; this arrangement constitutes an œsophageal loop; in the dorso-œsophageal region the sinistral nerve divides and sends a large mesal ramus to the lateral ramus of the dextral nerve (Fig. 2, M). Caudad of the diaphragm the disposition of the gastric nerves and terminal filaments presents distinct characters, but too complex for this discussion.

I have not called attention to the complex plexus formed by œsophageal rami. In a rabbit recently studied, the dorso-pulmonary portion of the ramus seemed to be a single trunk, and the dorso-œsophageal portion instead of presenting the trunks in their apposed relation, showed two distinct parallel trunks. Treatment with acid and alcohol, *under 25 diameters* (confirmed by higher powers), *revealed a true chiasmus* in which there is formed a crucial interlacing of fibres (Fig. 3); the nerves of either side undergo a characteristic decussation,—the lateral fibres continue caudad, the mesal fibres decussate, sinistral becoming sinistral and dextral, and dextral becoming dextral and sinistral; cephalic mesal fibres pass

from one trunk to a similar relation in the other; caudal mesal fibres exchange in like manner. The chiasmus is about 10 mm. in length.

THE URINARY PHOSPHATES.

BY GEO. F. HEATH, M. D.,

PHOSPHORUS was discovered in the year 1669 by Brandt. It is met with in nature only in the combined state, and is found in the primitive and volcanic rocks, and by their disintegration slowly passes into the soil. Here it is taken up by the myriad forms of vegetable life, and deposited more particularly in the seeds, as in the peas, beans, corn, wheat, etc., thus becoming the food of the animal kingdom; the phosphorus in the plant being transferred, and going to build up the tissues of the animal.

We can thus easily see how important a part phosphorus plays as an element in our food, and how it exists as a necessary element in the vegetable world and entering into nearly all the structures of the higher forms of animal life contributes largely to the formation of bone, is the essential or life part of the blood, brain, muscular and nervous tissues of the animal, and is an important agent in the nourishment and building up of the body.

Phosphorus is found in both the feces and urine of man; originally it was obtained almost exclusively from the urine of animals, but now almost wholly from bone by calcination.

The average man will excrete in his urine about five grammes of phosphoric acid daily. In proportion one gramme of the earthy to four grammes of the alkaline phosphates. This is the result of the oxidation of the phosphorus of the albuminoid tissues within the body, and the disintegration of the muscular and nervous tissues, the amount varying in proportion to the mental and muscular activity of the individual, usually when the excretion is much above this, the waste is greater than the repair and debility follows as a natural consequence.

As before stated phosphorus exists in the mineral kingdom, only in a combined state; the same is true in its relation to the animal kingdom.

fig 1. Crystals of triple phosphate x 50.

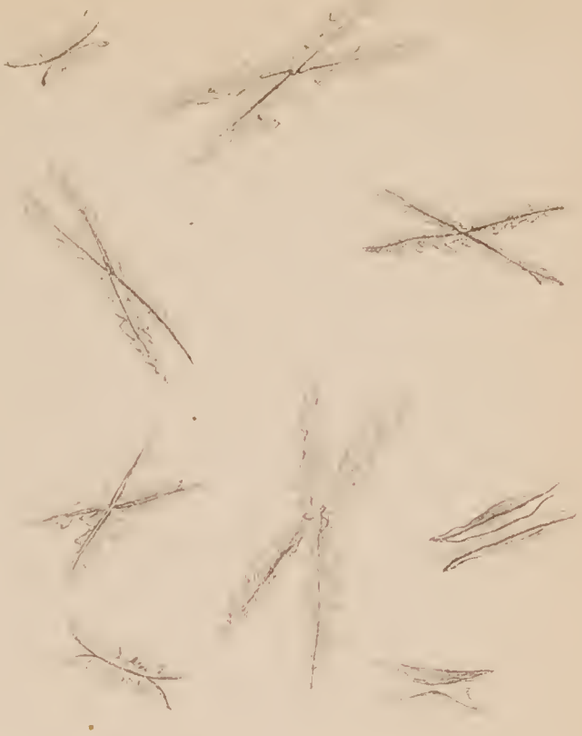


Fig 2. Crystals of triple phosphate. x 50.

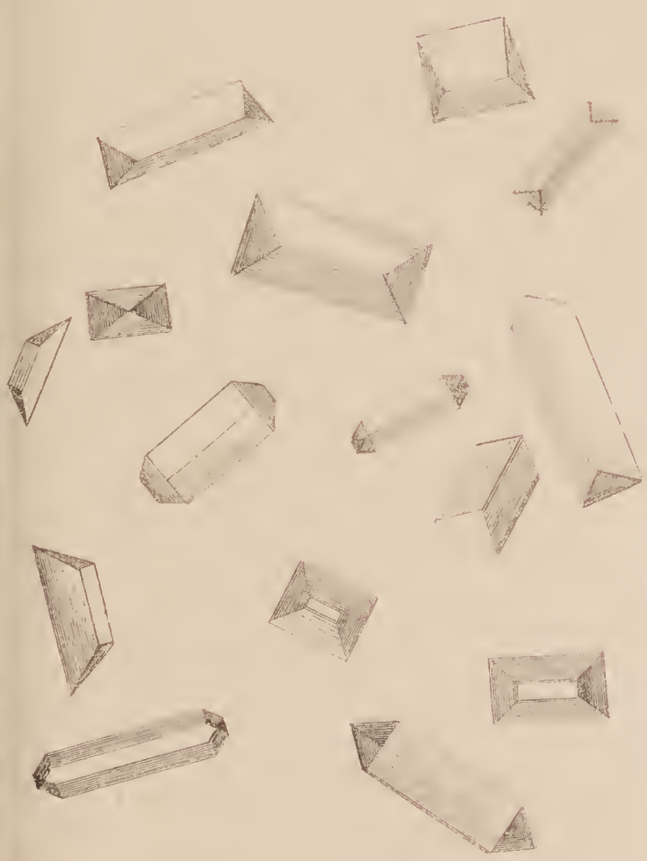


Fig. 3. Crystals of triple phosphate. x 50.

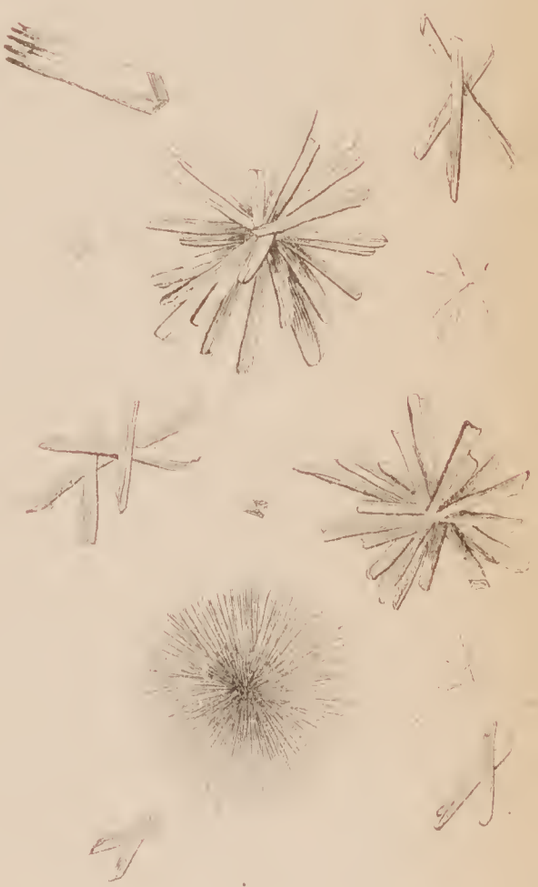


Fig 4. Phosphate of lime. x 150

In the alkaline phosphates we have phosphorus combined with sodium and potassium. This combination exists in the blood as well as in the urine ; being very soluble they are never found as a deposit in the urine.

In the earthy phosphates calcium and magnesium enter into combination with the phosphorus. They are held in solution by the acidity of the urine, when this acidity is lost, the result of disease, application of heat, or saturating, a deposit is thrown down called the amorphorus phosphates of lime and magnesia. They may be mistaken for urates under the microscope but easily distinguished by chemical tests. They are soluble in acids, insoluble in alkalies, and do not disappear by heating, while on the contrary the urates will disappear by the application of heat, are soluble in alkalies and insoluble in acids.

One of the most important of the urinary deposits is the prismatic or triple phosphates, a variety of the ammonio-magnesian phosphates.

This is one of the characteristic crystals of alkaline urine ; they are the result of the slow decomposition of the urea into ammonium carbonate, the urine is alkaline in reaction, and acquires a strong ammoniacal odor. When this change takes place, either within or without the body, we have as a result the triple phosphates, the ammonium combining with the magnesium and phosphoric acid, forming in beautiful transparent prismatic crystals with obliquely truncated or beveled ends nicely illustrated in fig. 3. When once seen under the microscope by a careful observer they need never be mistaken for any other urinary deposit. At times some of these crystals appear almost square, resembling the octahedra oxalates of lime, and may at a glance be mistaken for them, but chemical tests will soon decide.

These crystals are said to have been found in acid urine, but there is a difference of opinion among chemists regarding it. Beale says, "the acid reaction may be due to some salt present that reddens litmus paper and not to a free acid."

Unless these crystals are persistent in the urine the condition need not necessarily be pathological, but if continued, demands the attention of the physician and calls for repeated microscopical examinations of the urine.

The microscope will usually reveal, associated with these pris-

matic crystals, the urate of ammonia, rarely uric acid, sometimes the phosphate and the oxalate of lime, and often pus, mucous, and epithelium; though this is the rule there are exceptions. I have seen these prismatic phosphates in perfectly clear urine, the crystals being plainly visible to the unaided eye, no other deposit present, no distention or evidence of structural change in the bladder.

The urine, as in these cases, when alkaline from a volatile alkali is generally considered pathological, usually the result of some disturbance of the function of the bladder.

The prismatic phosphates are often found in the urine of persons suffering from dyspepsia, catarrh of the bladder, retention of urine from paralysis, or any interference with the nerve supply of the bladder resulting in paralysis with partial or complete loss of function, also in cases of general nervous debility in which the vital powers are much impaired.

Among the first two hundred cases treated this last year at Dr. Palmer's medical clinics at University Hospital, I noticed twelve in which the prismatic phosphates were found in the urine, or about one case in seventeen. Of these four were diseases of the stomach, (dyspepsia, gastritis,) three general nervous debility, one each epilepsy, psoriasis, eczema, paraplagia, and cystitis.

The most common cause of the appearance of these crystals in the urine is paralysis of the muscular walls of the bladder followed by retention.

The bladder not possessing the power to empty itself we have first distention and then if not relieved, decomposition as a consequence. The distended wall of the bladder sets up an irritation followed by inflammation in which the mucous lining becomes particularly involved, and if relief is not soon obtained may extend to the ureters and thence to the kidneys.

The treatment for prismatic phosphates in the urine consists in locating the cause and removing it. If from indigestion improve the action of the stomach, prescribe digestants.

If from debility and lack of tone, tonics, iron, quinine and the mineral acids particularly are valuable. If from debility from constipation, blue mass occasionally at night followed in morning by salines. If from retention due to paralysis, tonics, elixir phos. ferri, quinia et strychnia, teach the patient the use of the catheter and have the urine drawn regularly, frequent washing out of the bladder

with the double syringe, and the patient should drink a great deal of water. If we have retention from stone in bladder, the calculus should be removed. If from stricture of the urethra, the frequent passing of sounds will relieve. In the examination of urine especially in these cases, great care must be exercised, the vessel, of whatever sort, in which the urine is kept should be scrupulously clean, and, again, it should be examined as soon as possible after being passed, as the urine decomposes and becomes ammoniacal very rapidly, especially during a hot day, and when it contains any organic matter, as pus, blood, albumen or epithelium. Without these precautions the examination will be unsatisfactory.

The phosphate of lime is usually noticed in urine when alkaline from a fixed alkali. It is an amorphous floculent deposit, can be distinguised from epithelium and amorphous urates only by microscopical examination and chemical tests.

The phosphate of lime in crystalline form is sometimes found in the urine when it is faintly acid, neutral, or slightly alkaline. The crystals, faithfully represented in fig. 4, consist of crystalline rods or needles arranged singly or in groups forming beautiful stars, sheaf-like bundles, fans, rosettes, etc. These crystals are often found associated with oxalate of lime, uric acid, and rarely with the triple phosphates. These crystals may be produced artificially by uniting gradually in glycerine, solutions of the phosphate of sodium and chloride of calcium, or, again, by adding some chloride of calcium to normal urine and neutralizing the acidity with caustic soda.

The phosphate of lime is not a common deposit in the urine, but when it is found in quantity and persistent it then indicates some grave disorder. The deposits have been noticed in persons suffering from chronic rheumatism, phthisis, diabetis, cancer of the stomach, etc.

In normal urine, rendered alkaline by adding to it ammonia hydrate, the earthy phosphates are deposited ; the magnesium and phosphoric acid combining with the ammonia are deposited as ammonio-magnesium phosphate, in beautiful pennate, stellate, or snow-flake crystals illustrated in figs. 1 and 2. These crystals possess no clinical importance and can only result from the addition of ammonia accidentally or intentionally to the urine.

FROM CARTILAGE TO BONE AS SEEN BY THE MICROSCOPE.

BY JOHN H. LOBDELL, M. D.,
Professor of Histology Michigan College of Medicine.

THE change from cartilage to bone is a process which is understood, and, I may say studied, by but very few physicians and surgeons of this country.

It is a process of much importance, as it begins in the embryo and ends only when death ends every function of the body. There was no close study of the change until within the present century, and then owing to the poor facilities the study was incomplete and some of the most important conclusions erroneous.

It is only within a few years that the correct conclusions have been arrived at. For many years those studying developing bone, owing to their poor facilities, supposed that cartilage cells became directly transformed into bone cells; but this is not the case. I will, I think, safely say that the cartilage cell directly has nothing to do with the formation of the bone cell. The bone cell is an independent formation owing, as I have said, nothing to the cartilage cell. I will make my paper of as few words as possible covering the subject.

The first step of the change is the development of small capillaries and blood-vessels within the substance of the cartilage. Now begins the breaking down of the cartilage substance and cells. Owing to the metamorphosis of the melting cells we have formed blood globules, fat cells, marrow cells, connective-tissue cells, pus cells, etc. The points of developement of the blood-vessels appear as small round reddish masses, but under the microscope these masses are found to be the blood-vessels filled with reddish brown cells destined to take an active part in the formation of bone substance. By careful observation with high power, small cavities are found within the ruptured cartilage capsules lined with small cells resembling epithelium. These are, or are to become, the so-called osteoblasts. It is from these osteoblasts that the deposition of the basis substance of the bone tissue takes place, in an outward direction.

By more careful examination cells of the osteoblast may be seen pushing their way in the cartilage substance to become centers of

ossification. That bone cells are found within ruptured cartilage capsules is a settled fact and here arises the question as to the unruptured capsule having within themselves bone cells. I hope that at no late day this question will be settled. I have made a careful study of the subject and have never seen the cells in unruptured capsules. After the bone cells enter the cartilage substance the development continues as in other tissues of the body.

The study is an undertaking which requires much hard work, and is accompanied by many failures which necessitate the repetition of many parts of the work. One discouraging feature of the work is the fact that no permanent mountings can be made.

Mr. W. H. Hamlet has recorded the experiments he has made on the power of various substances to destroy bacteria, (the microscopic plants which are the most active agents of decay.) Chlorine and hydric peroxide proved fatal to them, while chloroform, creasote, carbolic acid, salicylic acid, etc., hindered their development, but did not destroy them.

Adulteration of Jellies.—We feel very doubtful whether it is possible to purchase a genuine article of fruit jelly. Every specimen we have been able to examine has contained gelatine, colored with some common dye-stuff, and sweetened with artificial sugar made from corn by the sulphuric acid process. Those who want a pure article of jelly will have to make their own.

Axle-Grease Butter Makers.—In Milwaukee, Wis., the war on the axle-grease butter makers of Chicago is being pushed with vigor, and they are being driven to the wall. Some of the testimony given as to how the pomatum is manufactured is interesting, one witness testifying that the receipt for making "best gilt-edge creamery" was to take 1,000 pounds of hog products, one hundred and fifty pounds of beef tallow, and twenty-five pounds of genuine butter, and mix them up with seasoning to suit the taste. We should say a little guano would about fix it out for a man who was blind drunk.—*Milwaukee Sun.*

Correspondence.

LETTER FROM PARIS.

PROFESSOR C. H. STOWELL:

Here we are at last in "beautiful Paris" and, like hundreds of other tourists, with guide book in hand, we travel from morning till night feasting our eyes and "cramming" our brains.

To-day has been devoted to the selecting of surgical and ophthalmic instruments. I am greatly surprised to find that even here in the largest instrument stores it is necessary to leave your orders from three to six days before it is possible to see your instruments, and even before they can be shown you they must be put in order and oftentimes made.

I, together with my friends Drs. Dobson, of Chicago, and Henderson, of Minneapolis, called at Nachet and Fils, of Rue St. Severn, to examine some fine microscopes, with immersion lenses made to their special order.

We intend soon to visit the large hospitals of Paris. We hear that even lady physicians have some difficulty in procuring this privilege.

Thus far we have met with but slight opposition which has been easily overcome, but in no place have we been received better than in Vienna. "In the city where dogs, cows and women do the principal part of the drudgery."

With our guide we set out early monday morning for the grand central "krankenhauses" and were introduced as lady physicians from America, which seems to be a charming word here.

The "director" received us with many bows and smiles and gave us tickets to visit the whole institution. We found that many of the students could speak English quite well and seemed to take great pleasure in showing us the patients, their modes of dressing and treatment. I noticed that all nurses were women, I asked why this was so, and was informed that "they made much better nurses and were so much cheaper."

We had permission to attend any of the clinics also private operations. So we selected first Professor Billroth's, which occupies two hours each day.

We witnessed many interesting operations during these two hours, as no time is lost in giving anæsthetics, for one patient is prepared while the preceding one is being operated upon.

I can add, with pleasure, that there was perfect order throughout the clinic and we were not in any way invited to "retire."

Some of the students seemed surprised to see four ladies walk in and take seats but there was not the slightest demonstration of any kind. After the clinic we were conducted to Professor Billroth's wards where he received us with his most gracious smiles and bows. Politeness with this people seems a special virtue. Professor Billroth is a fine looking aged gentleman, very corpulent. I feel tempted to suggest to him that a special course of diet would improve his looks and add much to his comfort, or perhaps a sea voyage might produce the desired effect.

I could fill pages with what we saw in the different departments of this old institution, but have time only for one or two points. I was shown two cases of resection of the stomach, one quite recovered and the other not expected to live. Only two recoveries out of five cases. Was shown six cases of ovariotomy, all doing well. I was informed that in no case do they administer any nourishment until after the fourth day, giving nothing but ice and opiates. After the fourth day they begin with milk and beef tea. If there is much adhesion and inflammation, iodoform is dusted in before the wound is closed. This has been tried only in a few cases. I noticed that in most of their dressings iodoform was much used.

MRS. B. A. OWENS, M. D.

H. S. STOWELL, M. D., Editor *Microscope*:

Dear Doctor:—In my article of last month, "The Microscope as an Aid to Correct Diagnosis in Certain Diseases of the Skin," I referred, by way of illustration, to two cases then under treatment; one Sycosis Parasitica, the other Favus. These cases illustrate so well the value of microscopic aid that I desire to report the result. Both had been treated per orem for years; each person had suffered impairment of health from the deformity; in the first case Trichophyton and in the second Achorion Schoenleinii were found. The process by which the parasites are destroyed is tedious, as each hair must be taken out from part affected to allow the paraciticide access to the fungus within the hair follicle, but, as a reward each patient is free from serious deformity, and each is improved in general condition.

C. C. YEMANS, M. D.,
84 Lafayette Avenue, Detroit.

Editorial Department.

THE MICROSCOPE IN SKIN DISEASES.

SINCE the appearance of our June number, and with it the article by Professor Yemans on the diagnosis of skin diseases by the microscope, we have received some scrapings from the cutaneous u rface of a patient who had a trouble that had defied about all the known remedies in the materia medica. Being discouraged at the failure of this treatment the attending physician forwarded by mail some of the scales removed from the patient by scraping the surface lightly with a scalpel. A small amount of this dust was placed upon a glass slide, a thin cover applied, and a drop of distilled water added. The specimen was examined first with a power of four hundred diameters and later with one of about a thousand diameters. There was no mistake about this specimen. Scattered among these horny cells of the epidermis there were seen long, wavy, branched, filamentous cells, with large groups of minute spores. Each spore was exceedingly small, quite highly refractive, and circular in shape. A weak solution of acetic acid, one-half per cent. solution, caused the epidermal cells to become more transparent without affecting the fungus. Here we had the unmistakable fungus, *microsporon furfur*, and the patient was troubled with the *phytosis versicolor* of Piffard, or the *phtheiriasis versicolor* of Fox.

Here again is one of those peculiar cases where the microscope, and with positiveness the microscope alone, can be of the utmost value and really indispensable. Just one line of treatment, in such cases, is indicated; viz, an anti-parisitic one, and under this treatment the disease must yield.

Without the microscope only one plan is left in such cases. It is the plan that was pursued in a case under the charge of an acquaintance of ours.

The patient had been treated, for two months, for erysipelas without the slightest improvement. Not knowing what else to do our medical friend prescribed a free application of sulphur ointment, for which there was a good demand in this particular locality. The

patient returned in a few days to report a perfect cure. We chanced to be an eye-and-ear witness to the following conversation:

Patient. Doctor, what what was that last salve you gave me?

Doctor. *Itch ointment*, Madam.

Patient. Oh! It cant be! I've not had the *itch?*

Doctor. Yes, Madam, I know *positively* that you have had the itch.

Patient. Oh doctor! How do you know it?

Doctor. *Because itch ointment cured you.*

Without the microscope we are forced, many times, to make our diagnosis from the remedy that cured, or from a post-mortem examination.

IN diseases of waste and mal-nutrition as exemplified in phthisis, we would most naturally expect to find MALTINE of the most value. In this we are not disappointed. The preparation of maltine with cod liver oil and pancreatine was prescribed for an acquaintance of ours, whose condition at the time seemed most critical. For some time the temperature had been between 101° and 103° with a rapid and weak pulse, cold sweats, extreme emaciation, etc. Just at this stage the above preparation was ordered. Small doses were taken at first, followed in a few days with full doses which were well borne. The temperature fell to normal in a few weeks, the body became better nourished and once more the patient left the bed. We not only like maltine alone, but we are highly pleased also with its combinations. Malto-yerbine and maltine with pepsine and pancreatine are elegant and useful preparations. The whole thing can be summed up in this: The more the profession knows about maltine and its combinations so much the more will Reed & Carnrick sell.

THIS issue of our journal will reach many who have not subscribed, and many, too, who own microscopes and who are especially interested in the microscope as an aid to their professional

work. Of course this journal must receive help from you if from anybody. This journal is the only one in the field particularly devoted to this branch of work. Therefore we ask of each of you, who know already what the microscope can do, to devote a little time and money to this matter and send us your subscriptions. You must know of cases where your instrument has proved of the greatest value; let such cases be known through our columns to your professional brethren. We hope this "editorial brief" will bring us returns exceeding any of our previous productions, and now that our pen is in, we add, exceeeding *all* of our previous productions.

THIS is only our third issue and yet we are so soon in trouble. We presume, too, that we shall have the sympathies of a large number upon their hearing the cause of our grief. You will find it by referring to the April number of the *Indiana Medical Reporter* and reading an article, "How to mount the starches," which appears without credit, as original matter, when the article was taken from our first number, and written by one of the editors, after a year of experimenting on the subject. But this is not so bad as it is to see the article copied in microscopical journals giving said journal the credit.

Alas! Alas! How could you be so cruel to one so young?

NOW that the warm season is with us, bringing its usual discomfort and actual disease, we would call the attention of our professional readers to a remedy which we have used in cholera infantum with marked benefit. Physicians have reported in its favor from every direction. We refer to Lactopeptine, the formula of which can be found on our advertising page 17.

YES! Diatoms are not only "the best and most easily applied tests for the microscope" as Mr. Peticolas informs us, but they are also the most beautiful. Those prepared by Mr. Peticolas, at Richmond, form a neat and beautiful series at a small expense.

WE have received a condensed list of microscopes and accessories for sale by the old house of J. Grunow. Established in 1852 it has continued to prosper by business tact and by a determination to keep well informed of the wants of the working microscopist, and then supply the want with promptness and satisfaction. We have in our possession one of their earliest, and at that time one of their largest microscopes. We use the stand and accessories today. Goniometer, parabolic condenser, polarizing apparatus, etc., all complete. Send for one of their catalogues.

ANCIENT DENTISTRY. — Sir Gardiner Wilkinson affirms that teeth stopped with gold have been found in Egyptian mummies, and other learned gentlemen hold vigorously tnat the thing is an impossibility. Dr. John Gaigor, in the interesting discussion going on in the British Medical Journal, says that in the Etruscan museum of Corneto, the ancient Tarquina of Etrurio, and a few hours distance from Rome, he has seen teeth in a skull bound together by threads of gold cleverly twisted in and out among them; and that he has seen the same thing in museums in the Vatican and elsewhere. From these facts he presumes that it is quite probable the ancient Egyptians had more or less skillful dentists. His deduction is supported by a gentleman who is positive that he once saw in the Meyer museum in Liverpool, the jaw bone of a mummified Egyptian in which a number of teeth were secured by a golden wire. It is also claimed that the Hindoos, 600 years ago, knew something about the art of binding together teeth that were disposed to abandon each other's company. Mr. Briggs, in his "Rise and Fall of the Mohammedan Power in India," describes a battle in which Kootubood-Din, the famous general of Mohammed Ghory, who built the Kootub, a tower which rises near Delhi to a height that makes it one of the most beautiful wonders of the world, slew with an arrow a powerful rajah whose corpse was afterwards identified, according to the writings of Ferishta, by his artificial teeth, which were bound together by wires of gold.—*Ex.*

Selections.

JAMAICA DOGWOOD (PISCIDIA ERYTHRINA.)—For a long time all that was known regarding this plant, was the fact, that the natives employed the bark of the root for taking fish in some of the larger rivers; hence its name piscidia erythrina—from piscis, a fish. A certain quantity of the powdered bark of the root would be thrown into the water with the certainty of stupefying or narcotizing a large number of the fish. These would float on top of the water and so were easily caught. It killed the smaller fish and sometimes even the larger ones. Fish caught in this manner were eaten without hesitation and were not considered unwholesome.

The common name is Jamaica dogwood, at one time it was called Linné erythrina piscipula—the "fish-catching coral-tree," and it has been sold quite extensively in Brazil under the name of mulungû or marungû. It belongs to the natural order Leguminoseæ. It is found in the islands of the West Indies, and is indigenous in the Antilles, where it is extensively distributed, flourishing chiefly in the lowlands, and on calcareous and volcanic soil in the vicinity of the coast. It is found most frequently in Jamaica. It is a small tree of about twenty feet in height, of very irregular spreading branches, with long compound leaves. The leaflets are opposite, three or four paired, with an odd one. They are oblong or elliptical, rounded at the base, entire, somewhat coriaceous, about two inches long and quite pointed. When young the leaves are covered on both surfaces with minute hairs, but when old they are nearly smooth. The lower surface is paler than the upper and covered with minute white dots. The leaves are shed early in the year, and previous to the development of the new foliage the flowers make their appearance. The wood is considered valuable being very heavy and resembling our English oak in durability and firmness.

The pulverized bark of the root is the part employed in catching fish, and the bark of the root is the part used in medicine and should be gathered during inflorescence, otherwise it is unreliable.

Description.—The bark of commerce appears in pieces of two to four inches in length and from one to two inches wide and about an eighth of an inch in thickness. The outer surface of some of the

pieces is of a dark grey brown, while others are of a yellow brown with no shade of grey present. The bark is frequently studded with flattened protuberances of a lighter color than the surrounding cork.

The central part of the bark is much lighter colored and when wet or freshly broken is of a peculiar blue-green color.

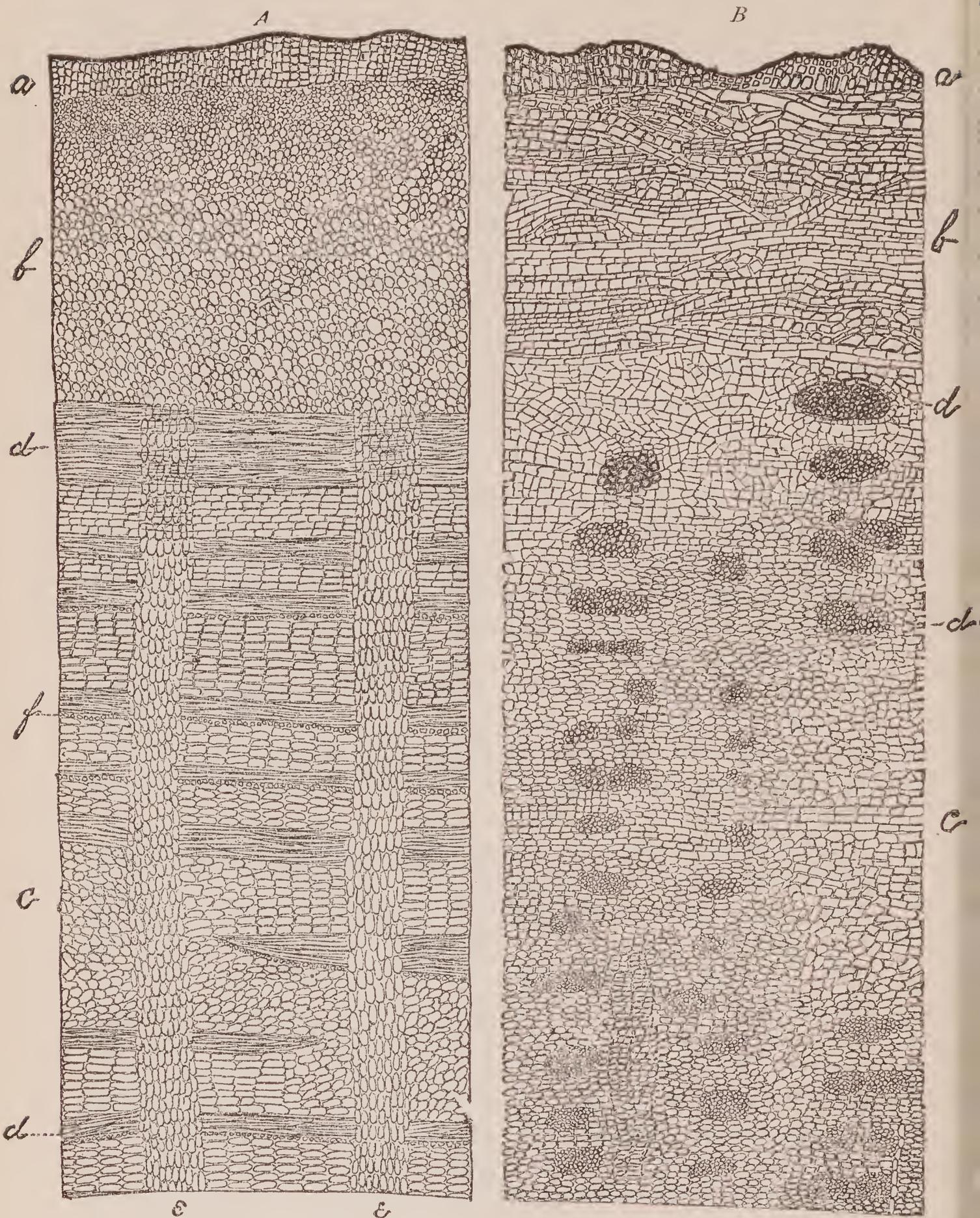
The inner part of the bark is of a dark brown color and very fibrous. It has a very strong disagreeable odor of opium when broken into pieces. It is strongly acrimonious and produces a burning sensation in the mouth and pharynx.

Microscopical Structure.—The cork or outer bark (see figure 1. *a*) is composed of about fifteen rows of thin-walled, regular, parenchymatous cells, brick shaped and arranged radially; *i. e.*, the length of the cell standing parallel with the radius. They are generally empty.

The middle or green layer of the bark (*b*) is composed of thin-walled, long, oval cells. In the longitudinal section they are arranged tangentially, *i. e.*, the longest diameter of the cell is at right angles with the radius. They average about 1-250 of an inch in length, and about one fourth as wide, containing clear white chlorophyll bodies and dead protoplasm and chlorophyll. Occasionally a crystal is found as if by accident. In the cross section the cells are oval or round and of irregular sizes. Sometimes oil cells are present. The cell walls themselves seem to have absorbed coloring matter, for they are not a clear white as is usually the case with cellulose.

The inner layer of the bark or the liber layer (*c*) constitutes the principal part of the bark, frequently being four-fifths of the whole bark. It is composed principally of regular parenchymatous cells of nearly equal diameters, and with thin walls. These cells are quite regular toward the inner surface of the bark and grow more irregular toward the outer edge of this layer. Some of the cells show pitted marks, which are deposits of cellulose on the cell walls.

Bundles of liber fibres are arranged in concentric rings through this part of the bark, hence its name liber layer. On a cross section (see figure 1, B) these fibres are composed of hexagonal cells with very thick walls, having only a spot or a central line for an opening. On a longitudinal section the fibres are frequently 1-10 of an inch in length. It is these long cells of the liber fibre that gives the fibrous



Jamaica Dogwood. A, longitudinal section. B, cross section. a, outer bark or cork. b, middle bark, or green layer. c, inner bark or liber layer. d, liber bundles. e, medullary rays. f, crystals. x 37 diameters.

structure to the inside of the bark. On either side of the bundles of liber fibre are rows of polyhedral crystals of calcium oxalate.

Medullary rays composed of regular brick shaped cells similar to those of the cork are seen traversing this layer. This part of the bark contains besides the liber and crystals of calcium oxalate, some oil ducts and resin glands,—apparently different in no respect from the surrounding cells,—some small scattered lactiferous tissue and separate oil drops.

Physiological Action.—It is said to be "a cerebro-spinal drug, expending its influence almost entirely upon the nervous system. It causes at first an increased activity of the cerebrum. This is shortly followed by a dazed feeling. There is a violent itching pain in the upper portion of the medulla oblongata, with nervous trembling."

It causes burning soreness in the eyes and heat in the internal structure. The eyes look wild and staring and there is a constant movement. There is excoriation in the nares posteriores with sneezing and coryza. There is also an aching pain in the temples. It induces labored breathing, and gradually the whole body comes under its influence. There is an intense excitation of the nervous system, causing a hot flush over the entire body, the pulse is increased ten or fifteen pulsations with pain in the heart and restlessness, which, however, is quickly succeeded by obliviousness."*

"Experiments upon animals have demonstrated power of this drug in large doses, to produce prompt paralysis of the motor nerves, while it does not affect the great centers of innervation—cerebellum and medulla,—the great sympathetic nerve, or the smooth or non-striated muscular fibre, neither does it affect the seat of intelligence, the heart rhythm, the temperature, or the peristaltic action."†

Properties and Uses.—Dr. William Hamilton of England speaks of this plant as a powerful narcotic, capable of producing sleep and relieving pain in an extraordinary manner.

"In Brazil it has an established reputation as a nervous sedative. Its action seems to be over the nervous centres; it causes sleep without producing the cerebral hyperæmia, nausea and nervous disturbances, which succeed opium and morphia. The sleep is tranquil and refreshing; it soothes bronchial coughs, and moderates the paroxysm of asthma and nervous coughs."‡

*George William Winterburn, M. D.

†Prof. Fernando Altamarano, M. D., of Mexico.

‡C. H. Hansen, M. D.

The active principle is a resinoid, soluble only in strong alcohol.

The dose is from 30 drops to two fluidrachms. It is applied externally as well as given internally.

Its most valuable therapeutic use is assuaging nervous pain and producing sleep.—Louisa Reed Stowell, M. S., in *Therapeutic Gaz.*

Oleomargarine vs. Butter.—It is my opinion that one can always detect the oleomargarine by the taste alone; but this is not said with any degree of assurance.

However, there can be no doubt that the better grades of oleomargarine are more palatable than common butter. On the score of healthfulness, oleomargarine can be confidently recommended. Chemically it has almost the same composition as butter.

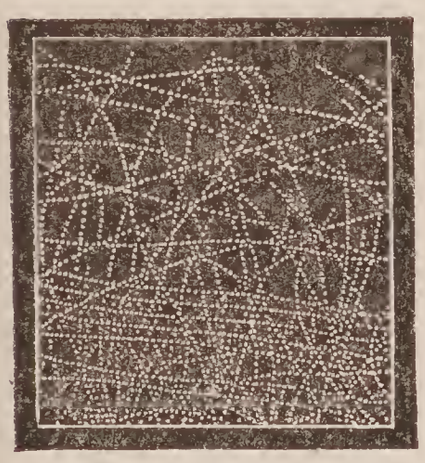
It has been asserted that lard is added to butter in the West; but no authoritative information upon that subject has yet come to my notice. Oleomargarine butter is mixed with the natural product by the farmers, at least it is so stated by persons who are probably well informed upon the subject; and this adulteration would be very difficult to detect unless the microscope would reveal it, and it undoubtedly would in some cases. An excess of salt in butter constitutes an adulteration, for not only does the salt injure the butter for consumption, but it also enables the maker to incorporate a large amount of water with the butter—even as much as 40 per cent. of water has been found in butter, held by the excess of salt.

The microscopical examination of butter and oleomargarine must be conducted with extreme care, for it is very easy to draw erroneous conclusions. Nevertheless, I am inclined to believe that the microscope will, when properly used, enable us to distinguish one from the other. As regards the impurities which have been stated to occur in artificial butter, such as muscular tissue and animal matter of various kinds, I have never been able to identify a single shred of muscle in any of my examinations. However, a certain amount of debris, which very likely comes from the fat cells, does occur in the artificial product. In the absence of distinct crystals, a person who is familiar with the appearance of both butter and oleomargarine under the microscope, would probably be able

to distinguish one from the other by the general appearance of the field, but not from any characteristics that can be definitely described. The artificial product possesses a certain grain, especially when examined with a power of 1000 diameters or more, which is not resolved into a minutely, crystalline structure, but which, nevertheless, shows some indications of a crystalline arrangement of the particles. Such an appearance is not to be observed in butter.—*American Monthly Microscopical Journal.*

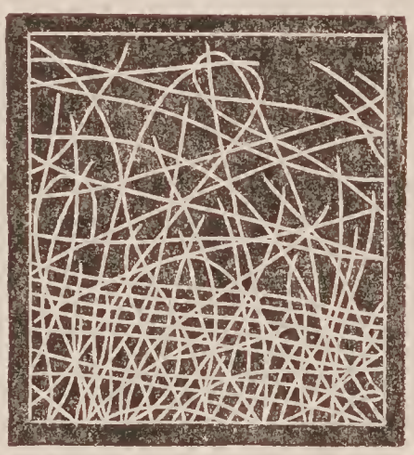
THE BACTERIA FALLACY ILLUSTRATED.—The following cuts illustrate and expose the great bacteria fallacy, and show the three classified forms of so-called bacteria, in diphtheria, to be nothing more than the three stages of the fibrillation of fibrin, of which the diphtheritic membranes are composed.

The mis-named micrococci, or spherical bacteria of diphtheria.



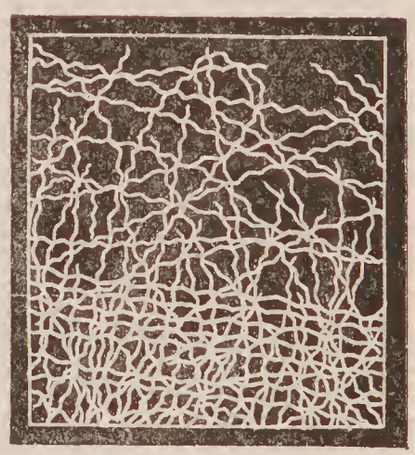
Granules of fibrin, or the first stage of its fibrillation.

The mis-named rod-like bacteria of diphtheria.



Fibrils of fibrin, or the second stage of its fibrillation.

The mis-named spiral bacteria of diphtheria.



Spirals of fibrin, or the contractive stage of its fibrils.

All the membranes of diphtheria are wholly, or almost wholly, composed of fibrin.

This fibrin is thrown out into the throat, or upon other parts, because it is in excess in the blood in this disease.

Were such excess not expelled from the blood-vessels, every severe case of diphtheria would soon prove fatal, from the fibrillation of this superfluous fibrin into large clots in the heart or pulmonary artery, that would instantly take life, or into smaller clots that would be driven along through the aorta into smaller arteries that would arrest them, when they would cause embolism and death in that way.

The expulsion of the excess of fibrin from the blood, upon those parts where it organizes into a membrane, is, therefore, a strictly conservative effort of nature to get such excess out of the blood and save the life of the patient, by avoiding its coagulation within the vessels, and certain death were it not expelled.

It is the one especial attribute of fibrin to fibrillate, whether in the clot of healthy blood, in the coagula that form in the heart or arteries from its excess in the blood, or in diphtheritic membranes. And in fibrillating it always organizes first into granules, then these join together into fine threads, which threads contract into spirals, if their ends are left free from attachments, as shown in the cuts.

Consequently, there was never a drop of healthy blood coagulated that it did not yield these three forms of so-called bacteria—spherical, rod-like and spiral; the first two while the fibrin was organizing, and the last while the coagulum was contracting or shrinking into a smaller compass. No clot of blood could ever become smaller, as all do, but for the fibrils contracting into spirals, and thus shriveling the whole mass.

In the heart-clot precisely the same process is carried out, the excess of fibrin organizing first into granules, and these joining into threads, and the latter contracting into spirals. And, furthermore, the first two of these steps are taken in precisely the same way with the excess of fibrin thrown out of the blood upon any surface, where it organizes into a membrane, while all fibrils, the ends of which are left free from attachments, contract into spirals and this gives us the so-called spiral bacteria in connection with diphtheria.

Thus it will be seen that this whole question of the membranes of diphtheria, the falsely assumed bacteria in connection therewith, the coagula of the heart in this disease, etc., may be placed at once upon a purely scientific basis, if the profession so desires. And by this showing, too, it will be seen that the exercise of a little common sense, and the proper application of a few simple facts to the solution of the subject, by the original promulgators and promoters of the bacteria theory, would have saved the medical profession a great disgrace, would have avoided hastening tens of thousands of patients out of the world in the vain effort to destroy by treatment what did not exist, as vegetable parasites, and would have rapidly advanced, instead of retarded, our knowledge of this terrible disease.—*R. R. Gregg in The Investigator, Buffalo, N. Y.*

Items.

Never cry over spilt milk. There is enough water in it already.—*Ex.*

They're still on the hunt for oleomargarine. Tallow ho!—*Hartford Journal.*

A weak mind is like a microscope, which magnifies trifling things, but cannot receive great ones.—*Ex.*

The Boston *Transcript* says the milk train does not stop at whey stations. Where, then, does it take in water?—*Ex.*

"I find that with light meals my health improves," said the Esquimaux; and down went another candle.—*Courier Journal.*

If a man is very sick and needs immediate attention, what kind of a physician do they send for? Why, a nigh and near doctor, of course.—*Baltimore Every Saturday.*

Glucose and other manufacturing interests have prevented the passage by the Illinois legislature of an act against the adulteration of food and drugs.—*Ex.*

When you read the seductive legend in the tobacconist's window, "Our five-cent cigars can't be beat," remember if they can't be beet, they may be cabbage.—*Ex*

"Plenty of milk in your cans this morning?" a customer asked the milkman, the other morning. And the milkman nodded gravely as, without a wink in his eye, he replied, "Chalk full."—*Ex.*

A single doctor like a sculler plies;
The patient lingers and by inches dies;
But two physicians, like a pair of oars,
Waft him with swiftness to the Stygian shores.—*Ex.*

A doctor went out for a day's hunting, and on coming home complained that he hadn't killed anything.

"That's because you didn't attent to your legitimate business," said his wife.—*Ex.*

"This is a sad commentary on our boasted civilization." A tramp despondingly observed when he discovered that the ham he had taken from the front of a shop was a wooden one.—*Ex.*

When some one said inadvertently that a certain person had died "without the aid of a physician," he knew at once that he had done injustice to a noble profession, and added, "but such instances are of very rare occurrence."—*Ex.*

An editor apologized to his readers after this fashion: "We expected to have a death and a marriage to publish this week, but a violent storm prevented the wedding, and the doctor being sick himself, the patient recovered, and we are accordingly cheated out of both."—*Ex.*

Various kinds of smoke have recently been examined microscopically, and found to consist of particles having a diameter of about the fifty-thousandth part of an inch.—*Ex.* We have had smoke in our eyes consisting of particles having a diameter of about fifty-thousand inches.—*Ed.*

Prince Tortonia of Rome keeps two doctors employed in attendance upon the indigent poor of that city, provides for 300 children and educates 350 others, has established an asylum for the aged and a hospital for the blind, gives 120 meals daily to the poor, and, as Mr. Swiveller observed of the earth, comes various games of that sort.—*Ex.*

"How flagrant it is!" said Mrs. Mixer, as she sniffed the odor of a bottte of Jamaica ginger. "It is as pleasant to the oil factories as it is warming to the diagram, and so accelerating to the cistern that it makes one forget all pain, like the ox-hide gas that people take for the toothache. It should have a place in every home where people are subject to bucolics and such like melodies.—*Ex*

The Parasite Theory in Ophthalmology.—Dr. Seely puts himself on record in regard to this theory as follows:

"The danger in all conjunctival inflammations is corneal complication, and that that complication comes from infection, I believe, will hardly be denied; and, furthermore, that the infection arises from loses of corneal epithelium allowing entrance to the germs; and, furthermore still, that in a vast number of cases the erosions

are brought about by officiousness of the surgeon and his injurious remedies, I firmly believe."

Concerning lesions of the cornea I fully concur with Dr. S.; sins against poor inflamed eyes are oftenest those of commission; would they were of omission, nature would have a better chance.—*Cincinnati Lancet and Clinic, April 17.*

The San Francisco Microscopical Society is discussing the value of a test for the genuineness of signatures by microscopic examinations, which has been proposed by Dr. J. H. Wythe. Dr. Wythe maintains that every man's hand-writing is infallibly distinguished by three characteristics, that may be detected by the microscope while they escape the eye, which he calls the rhythm of form, dependent on habit or organization; the rhythm of progress, or the involuntary rhythm, seen as a wavy line or irregular margin of the letters; and the rhythm of pressure, or alternation of light and dark strokes. The proper microscopic examination of these three rhythms, under a sufficient illumination of the letters, cannot fail, he believes, to demonstrate the difference between a genuine and an imitated signature. The correctness of his conclusions having been disputed, Dr. Wythe made an address on the subject at a special meeting of the society, and exhibited specimens of writing in support of his views.

The Detection of Coffee Adulterants.—It is said that over three million pounds of chicory are imported into the United States annually, to be used in the adulteration of coffee. Dandelion root is also largely used. A British chemist states that these substances are readily deprived of color by a weak solution of chloride of lime (hypochlorite), and that this agent has very little action on the coffee. When this method is adopted, a portion of the coffee should be gently boiled a short time in water, with a little carbonate of soda, so as to remove extractives as much as possible; after subsidence the liquor should be poured off and the residue washed with distilled water. When this has been sufficiently done, a weak solution of the hypochlorite of lime is to be added and allowed to remain, with occasional stirring, until decoloration has taken place, which will probably be in two or three hours. The coffee will then form a dark stratum at the bottom of the glass, and the chicory a light and almost white stratum floating above it, and showing a clear and sharp line of separation.—*Med. and Surg. Reporter.*

MILK ADULTERATION.—The milkmen of Scotland seem just now to be in luck. According to the British Medical Journal, a dairyman of Glasgow recently adulterated, or rather reduced, his commodity fifty-six per cent. by skim-milk. Some one bought about three pennyworth of this milk, and, suspecting crookedness, had it analyzed. The offender was brought to justice, but escaped punishment through the smartness of his attorney, who was able to make the law so read that the purchaser must state that he desires for analytical purposes all or a part of the milk bought. That is, as the law stands in Glasgow, it is criminal to adulterate milk intended for the chemist's laboratory, but venial if it be designed for general consumption.

We take it that the statute will have to go back to its framers for revision; and in the meantime skim-milk, without let or hindrance, will do its fearful work upon the defenseless people.

"O, Scotland, Scotland!
. . . . . .
O, nation miserable!"

—*Louisville Medical News.*

IS THERE DANGER IN MILK.—The question of the impurity of milk, as a probable cause of disease, has been agitated quite frequently of late in different sections of the country. Here, in Louisville, where it is supposed by the outside world, we never see anything but the richest and purest, and most delicious kinds of milk it were possible to obtain, complaint has already been made of the dangers of allowing the milk-men to drive across the little streams, as for instance, Beargrass Creek, Paddy's Run, etc. Now, it is barely possible that scarlet fever, typhoid fever, diphtheria, and a host of other diseases, may possibly arise from poisons contained in the milk of diseased cattle. It is, likewise, possible that the unfortunate milkman, who lingers by the way-side, in the early hours of the morning, may incur the risk of having his milk contaminated by the process of dilution, which is so likely to follow. As pork and beans may destroy life, so may milk, or even pure, cold water.—*Med. Herald.*

OLEOMARGARINE AGAIN.—From the first we have regarded this product as a contribution of chemical science to domestic economy, in the interests of the human family. Were it not for the motives of trade and the fears of competition on the part of the dairymen,

there would have been but little question on the subject. The case is one of selfishness and prejudice arrayed against the interest of the people, the poorer classes more particularly. Only, let the article be sold for what it is and not for genuine butter. Impartial analysis has never yet condemned it. Very recently the New York Board of Health, being urged to take action against its use, referred it to Prof. Chandler, State Chemist, for examination and analysis. His report will be likely to stand as a permanent verdict. He says it is superior to lower grades of dairy butter; that there is nothing objectionable in the material, and as there is nothing unwholesome in oleomargarine, he sees no need of legislation to protect the public health.—*Pacific Medical and Surgical Journal.*.

A stringent law has been passed in two of the States against the adulteration of food and drugs. It is greatly needed. The editor of this paper, passing through a spice factory, found every label false, and the owner admitted it. The excitement on the sugar adulteration, like the furore against swill milk, rises now and then, but soon subsides. The fatal weakness of our wise and good laws in this country is that there is nobody to look after their enforcement. It used to be said on Mississippi steamboats, "If you want to enjoy your dinner, don't look into the kitchen." It may now be said, "If you want to feel safe while you are eating, know as little as you can about the elements of which your food is composed." But whether these laws be enforced or not, we can be sure of eggs and meat, and fruit and potatoes, and of milk, (if we keep a cow,) and of home-made bread, (if we keep an eye to the baking-powder.) The coffee drinkers can be sure of their coffee, if they roast it and grind it; but the tea drinkers must walk by faith in the grocer.—*Ex.*

Vinegar Adulteration.—In Glasgow, Sheriff Balfour gave decision in a case under the food and drugs act. The accused, George Lindsay, grocer and provision merchant, was charged with having sold to Robert Inglis, sanitary inspector a bottle of malt vinegar, which on analysis was found did not contain any of the constituents of malt vinegar, with the exception of 5.48 per cent. of glacial acetic acid, water, and a trace of saccharine matter. The Sheriff, in passing sentence, said the question in this case was simply this, whether it was malt vinegar that was sold, or acetic acid and water. Malt vinegar was asked for but he held it was not malt

vinegar that was sold. The practice was one that ought clearly to be put a stop to. The mere fact of the practice having crept into the trade at Glasgow was certainly no reason why he should not convict in this case, but rather a reason that the practice, which was a bad one, should be put a stop to. The practice simply amounted to this, it was sailing under false colors, and selling an article under a misleading name.—*Glasgow Herald.*

Fine Rulings.—We recently referred to "Fasoldt's Test Plate," which it was then claimed contained lines ruled at the rate of 1,000,000 to the inch.

Dr. R. H. Ward, of Troy, N. Y., writes upon the subject as follows:—

"In speaking of the modern microscopic rulings on glass, which have been regarded with so great and deserved an interest by all physicists, one cannot be careful to discriminate fully between those that are known to be ruled and those whose ruling has been attempted but not yet demonstrated. It is self-evident that, in attempting to rule lines 5,000,000 to the inch, a band may be produced which does not consist of lines of that degree of fineness. There is no difficulty in arranging a machine to draw lines, theoretically, of any required degree of closeness. The register of a ruling engine can be so arranged and subdivided as to indicate a spacing at the ruling point of one ten-millionth of an inch as easily almost as of one-tenth of an inch; but it may well be doubted whether such fine motion is actually imparted to the diamond point, or could be recorded upon the surface of the glass. It is becoming common to hear the higher bands of Mr. Fasoldt, claiming up to 10,000,000 lines to the inch, spoken of as actually ruled, and only waiting an objective to reveal them. Such an error, made inadvertently by persons who would avoid it by a little reflection, as made in the last number of one of the most popular microscopical journals, gives a lasting as well as erroneous impression to non-scientific persons. Mr. Fasoldt's rulings are certainly remarkable, and the lower bands are ruled with great success; but how far up the scale they continue to be ruled as distinct lines is certainly at this time an undecided question."—*Royal Microscopical Journal.*

Microscopical Examination of Blood in the Diagnosis of Disease.—For the purpose of these investigations, M. Hayem recommends the use of a cell thus constructed: a thick plane glass slide has a disk made on it of about 4 mm. in diameter; the rest of the slide is silvered; a small drop of blood is placed on the disk and is covered by a thin cover-glass, so that a layer of uniform thickness is obtained. A little saliva placed round the edge will prevent any evaporation.

When blood is treated with a mixture of 200 grammes of distilled water, one gramme of pure chloride of sodium, five grammes of sulphate of sodium, and half a gramme of pure bichloride of mercury, the blood-corpuscles are separately isolated and distinguished from the other constituents. The fibrine then breaks up into two distinct groups.

Perfectly normal blood, thus treated, shows the following reactions. At the moment when it coagulates it is traversed by a very delicate network of filaments. If at the moment of coagulation a reticulum of thick fibrillæ is seen, we may be sure that we have indications of an inflammatory lesion, and the modifications in the processes of coagulation are due to the extent and intensity of the inflammation. Pyrexia is not accompanied by any appreciable modification of the fibrine; but when fevers are complicated by inflammatory process there are such modifications. In small-pox they only appear with the suppurating fever; in scarlet-fever and scarlatina the fibrine only augments at the period of desquamation. So again, in typhoid and intermittent fevers the so-called phlegmatic characters only appear when the disease is complicated by inflammation.

When cachectic conditions are not the results of chronic diseases, which bring about inflammatory lesions, the reticulum of the pure blood generally remains invisible, or is obscure, notwithstanding the unusual abundance of hæmatoblasts. Examination by the aid of the solution already described, shows, however, that the fibrine is allied; in advanced cases one often observes the so-called "plaques cachectiques," due to the infiltration of the hæmatoblasts by a finely granular substance, which points to a qualitative change in the characters of the fibrine.—*Royal Microscopical Journal.*

Reviews.

THE HUMAN BODY. By H. Newell Martin.

In our review of this work in our last issue we spoke disparagingly of the fact that the appendix on "reproduction" was inserted in what was otherwise such an admirable work. With the appendix we could not recommend the work as a proper one in our schools. Since writing said review our attention has been called to the fact that an edition is issued *without* the appendix. We are glad to make this correction, and it would be a very difficult matter now to criticise this work or see how it could be better fitted to its place.

A MANUAL OF ACCIDENTS AND EMERGENCIES, or how to avoid accidents and what to do when they occur, with notes on the preservation of health. By Geo. G. Groff, M. D., professor of physiology and natural history, in University at Lewisburg, Pa., pp. 92. 1881.

By carefully reading this book and retaining its teachings the reader will be able and ready to act promptly and intelligently on every emergency, and to ameliorate suffering until medical aid is procured; for the book recognizes the necessity of the physician and "send for a physician at once" are words repeated many times. The table of "poisons and their antidotes" is a valuable one. Rules for bathing; signs of death; health maxims; care of the eyes; these are some of the headings. A great deal of condensed knowledge of practical value in ninety-two pages.

HANDBOOK OF SYSTEMATIC URINARY ANALYSIS, chemical and microscopical, for physicians, medical students and clinical assistants, By Frank M. Deems, M. D., Instructor in University of New York, etc. Published by the Industrial Publication Company. Illustrated, pp. 30.

This little work would make a large book if common sized type were used and also if the tables were explained in the usual way.

It is a time-saving work to the busy practitioner. The author shows he is familiar with his subject, and that he appreciates the convenience of a bedside reference-book and work-table companion. It is a systematic arrangement of the various microscopical and chemical analyses of the urine.

HISTOLOGY OF THE LOCUST AND OF THE CRICKET. By Chas. S. Minot, Lecturer at Harvard University, pp. 62. Eight full page lithographs, 66 figures.

Professor Minot has entered into a complete and exhaustive study of these little studied insects. A study of this book is of especial value to all entomologists. The bibliographical index alone gives the author great credit and makes the report a work of reference.

OUR LITTLE ONES.

This monthly of 32 pages is one of the best, and in many respects the best, periodical for the "little ones" we have ever seen.

The engravings are especially fine, the type clear and large, and the stories attractive as possible. It is a model of beauty in its typography and illustration. Russell Publishing Co., Boston, Mass. $1.50 per year.

A REVIEW OF PROFESSOR WINCHELL "PREADAMITES." By Rev. J. T. Sunderland, pp. 23. Reprint from Unitarian Review, March, 1881.

DENTISTRY AND DENTAL EDUCATION. By W. W. Allport, M. D., D. D. S. Reprint from April number of Chicago Medical Journal and Examiner.

THE AMERICAN MEDICAL COLLEGE ASSOCIATION, transactions of, for 1881, pp. 8. Detroit, Mich., Post and Tribune printers.

FREE-TRADE FROM AN AMERICAN STAND-POINT. A pamphlet of sixteen pages, a reprint from the London Contemporary Review.

THE JOURNAL OF THE ROYAL MICROSCOPICAL SOCIETY, for June, 1881, London, England.

This bi-monthly is well known in this country as an indispensable part of a microscopist's library. Each number consists of nearly 200 pages, and contains the current researches relating to zoology, botany and microscopy. The journal is also illustrated with lithographs and wood-cuts. The transactions and proceedings of the Royal Microscopical Society are given in full, these alone being worth the price of the journal. Price, 4s per number. King's College, Strand, W. C.

WHAT OUR EXCHANGES SAY.

Our personal knowledge of its editors and publishers is a sufficient guarantee that the promises given with the editorial bow will be fully carried out. It opens up a new field of medical journalism and one which if well cultivated (as it will be) will "fill a long felt want" on this subject.—*Therapeutic Gazette.*

It affords us great pleasure to notice the appearance of this new journal. * * * and the projectors and editors, being well known in this line of investigation, will make the "Microscope" a welcome visitor to all who appreciate the importance of the instrument that has opened a new world to the enquiring scientist.—*Journal of Pharmacy.*

The names of its editors is ample guarantee to insure for this new journal the success it deserves.—*Good Health.*

If it continues to be thus ably edited there need be no fear of its failure.—*Monthly Index.*

It fills a sphere of its own and should be in the hands of every physician and druggist in the country. Both editors have a practical acquaintance with microscopy, and the results of their experience cannot fail to be valuable to all workers.—*American Microscopical Journal.*

Simple Device for Handling thin Covers.—Cut a piece of suitable size from a flat rubber ring, fix this by a large-headed pin, cut short, on to the end of a cedar stick, driving the head of the pin so as to form a depression in the rubber. Wet the rubber, and on pressing it on a cover-glass it will adhere to it and the glass may be manipulated as desired. To disconnect the rubber from the glass it is merely necessary to incline the stick so as to detach the rubber at one edge when the adhesion ceases at once. The apparatus is more durable if a little cementing material be used on the stick as he pin sometimes draws through the rubber.—*Royal Mic'l Journal.*

THE MICROSCOPE

AND ITS RELATION TO

MEDICINE AND PHARMACY.

Vol. 1. Ann Arbor, October, 1881. No. 4.

CONTENTS.

PAGE.

Original Communications.

Practical Hints in Mounting. By R. N. Reynolds..... 97
Laboratory Notes. By C. H. Stowell. 98
Letter from "Grey Beard."..... 100

Selections.

Desiccated Blood..... 103
Claims of the Microscope..... 109

PAGE.

Editorial Department.

Is a "Familiar, Colloquial Style" Inelegant and Undignified?..... 111
Special Offer to Subscribers..... 112
New Discovery..... 113
The Trichinoscope..... 114
Mr. Phin's Journal..... 114

Items..... 115
Reviews..... 126

Original Communications.

PRACTICAL HINTS ON MOUNTING.

BY R. N. REYNOLDS, D. & M. JUNCTION, DETROIT.

STANDING before me is a dusty Air Pump a relic of the days in which we fought air bubbles in our mounts for the microscope. Well we remember those battles, how after the smoke of broken cover glasses and sticky fingers were cleared away, only a few bubbles were found and these had pluckily followed the object nearly out of the field.

Now the air pump has stopped never to go again in mounting, and instead of fighting the bubbles we keep clear of them.

We take our object (for balsam mounts) from spirits of turpentine and while well covered with the spirit place it on the slide and quickly apply the Canada balsam, before place on the cover glass and center before it has time to settle, else the object will move with the cover.

For replacing objects found out of center we use a needle which has been driven eye first into a piece of soft wood for a handle, and then ground down on two opposite sides until only a thin blade of steel is left, this is to be warmed and inserted under the cover forcing the object back.

The mount freed from excess of balsam is to be kept in a warm place for about two days, then on the turn table the edge of the mount is given a couple of coats of shellac dissolved in alcohol, or one coat of Bell's cement, to prevent the white zinc which is to follow from touching the balsam.

After drying another day replace it on the turn table and with pretty thick white zinc cement cover the shellac and edge of cover glass, and apply the color rings at once. For these we use French tube paints mixed in damar and thinned with benzole, thus with once centering on the turn table we have applied the zinc and as many rings as we wish. Allow a day or two for drying, next and last give the whole cement work a coat of best coach varnish which will preserve the glassy appearance of the work. It is important that artists brushes of red sable be used. We use No. 8 for the white zinc, shellac, and varnish, and No. 1 for color rings.

If other readers of THE MICROSCOPE will join me in giving their methods of mounting, etc., then I will give my methods of making, easily and quickly neat hard cells of any desired depth for either opaque or transparent mounts, and many other points in mounting.

Let us help THE MICROSCOPE and each other by showing up little bugs and the humbugs we have been induced to purchase to mount them with.

LABORATORY NOTES.

IT often occurs that some fortunate circumstance gives a man more credit than he really deserves. Thus it happens occasionally, that the microscopist discovers a fraud or diagnoses a disease in a very simple way, but with such satisfactory results that great credit comes to him. We recall a few such cases.

A physician exhibited, before a small medical gathering, a specimen he had removed from the interior of the uterus and supposed by him to be "an organized membrane." The specimen was two by

three inches in size, not very thick and of a dark color. Without the knowledge of the "surgeon" a piece was obtained, placed in water for a short time and then a thin fragment placed under the microscope. Here were spiral-vessels, stomates, etc. If any of our readers desire to know just how this "membrane" looked under a one-fourth objective and a "C" eye-piece they have only to prepare in a careless way a piece of *red cabbage leaf*.

Dr. Angears case (see article on "Claims of the microscope,") has its counterpart in one recently before us.

A lady called in great trouble of mind over her distressed condition. She was positive that the mucous membrane of the whole alimentary canal was passing off. She had tried home remedies for a number of days without effect unless to aggrivate the disease. She was exceedingly nervous and had great fears concerning herself. Some of this "mucous membrane" was placed under the microscope and resolved into *spiral vessels*. A close questioning revealed the fact that celery had composed a principal part of the diet and the more nervous the patient became the more celery was used. Of course the cure was simple and complete.

Only a few days ago we were called upon to decide which of two powders contained the least starch. A diabetic patient was paying thirteen cents per pound for some "diabetic flour." He had received a sample of another brand, twenty cents per pound, said to be "nearly free from starch of any kind." Specimen No. 2 was found to contain plenty of wheat starch, but the question here was, which powder contained the least starch? We manipulated as follows: A square cover-glass was placed upon a glass slide in such a way that one edge of the cover was over the centre of the slide.

With a camel's-hair brush some of the powder was dusted over the glass-slide close to the edge of the cover, some of the powder getting upon the cover during the careful dusting. The cover was now turned directly over the powder.

With another brush some of powder No. 2 was dusted upon the slide close to the edge of the cover-glass, some of the powder getting upon the cover as before, but unable to mix with powder No. 1, although very close to it. This cover-glass was now carefully removed and a clean cover as carefully added. Here are two powders, evenly dusted over the glass and only separated by a narrow line directly across the centre of the slide. With low powers

the two powders are seen in the field together, and when higher powers are used it is an easy matter to move the object but a trifle. This is a good way to compare a suspected powder with one known to be pure, after examining several slides in this may, and after trying to have others deceive us by changing slides, we came to the conclusion, without doubt, that the twenty cent flour contained a third more starch than the thirteen cent flour, just the opposite claimed.

It would appear that nothing could be more simple than an examination of the contents of the mouth, but cases have occurred with us recently which go to change our belief on this subject, as a rule, however, it is an easy matter to remove some of the saliva to a slide, to wait a moment for the air-bubbles to rise when they can be broken or moved off with a needle, then to apply the cover and examine. But here one must be familiar with the different extraneous matters likely to be met with. Among them we might enumerate most of the starches, oil globules, portions of tissue, vegetable cells, the commercial fibres, the various "coatings" of the tongue, etc., and these mixed with sputa make a formidable mass.

(*To be continued.*)

LETTER FROM "GREY BEARD."

Dear Editors of The Microscope:

SOMETIMES the old man in the "swamps of Louisiana" gets lonesome, and at such times is very apt to inflict some of his friends—he considers all who appreciate Microscopy as such, and usually awaits no further introduction—with a specimen of his miserable chirography, to say nothing of his "unelegant style." Notwithstanding your journal is "so young"—only third issue—and that your "style" is "familiar," "colloquial" and "undignified," yet THE MICROSCOPE (the journalistic one) has found its way to several in the "swamps of Louisiana," and its influence for good is already being felt in this locality. Twelve months ago, outside of New Orleans, there was not a microscope stand, to my knowledge, within fifty miles of me. Recently I had occasion to wade out of the swamp, seeking *terra firma* in search of drugs for swamp fever, the

nearest point being our parish capital, four miles distant. On entering Mr. ——'s drug store, the first thing which greeted my eyes was a good modern microscope, and accessories well adapted to the use of the pharmacist. On my asking the meaning of it, the reply in substance was: "I'm a subscriber to THE MICROSCOPE, and intend following up the good work it is doing for the drug dealer and his customers." Here, my dear Editors, is one instance of the good work being done by your "free and easy writing." For the sake of poor adulterated drug-swallowing humanity, don't change the style of THE MICROSCOPE.

There are, comparatively, very few in the southern states who are acquainted with the use of the microscope, being far behind your locality in this respect. Here the manipulating microscopical schoolmaster is needed; hence I shall take the liberty of an old man, who, although very dull, has been taught something by forty years use of the microscope, to suggest that you devote some space to very simple and plain directions, in detail, how to manipulate the instrument in examination of drugs. There are many druggists who would follow your good work if aided in how to manipulate the instrument for that purpose. In "How to Use the Microscope," for beginners, and "How to See with the Microscope," for the advanced, we have two of the best works up to date; yet a little more, if only a repetition of the little things, will do no harm. While the handling of a student's stand with good (non-adj.) dr. ¾ and 1-5 objectives is a simple thing, even to a novice, if he received a little well directed instruction about the little things, yet without this instruction, nine out of ten will be like a ship at sea, with rudder broken, and no one aboard to renew it, and likely the instrument would be put aside in disgust. Now, "Grey Beard" can speak feelingly on this point, for, being a home-spun, he has had "experiences," some of which were ludicrous in the extreme from this very simplicity, and yet had seen others in just as leaky a boat as his own.

I wish I were an M. D.—I would like to indulge in some "doctor talk" (?) to-night; but no, will spare you the farce; yet must be permitted to say that this is a rich field for research to the medical microscopist. The instrument has doubly read me a lecture which no medical faculty will dare to controvert, viz., that filth is a great factor in the spread of disease, and is certainly on great terms of intimacy

with our southern epidemics, though I venture not a word, *pro* or *con*, about germs.

Perhaps, Doctor, you may feel like asking, "Who are you to thus call on us without an introduction, and indulge in such egotism." Answer.—One who dearly loves the microscope, be it for scientific research, cultivating the mind and love for the true and beautiful, ennobling the character, or to proclaim that there is an "Almighty Architect of the Universe" by bringing us face to face with the works of Omnipotence—in fact, a microscopical missionary, one of those pioneer fellows who go ahead and cut down the underbrush, in hopes it will tempt some more skillful workmen to follow. When a little boy I was very timid—perhaps you think I am bravely over it in old age—and when first called upon to "appear in public on the stage," I was so disconcerted that I did nothing but to give utterance to "Large oaks from little acorns grow," rapidly repeating the same till "the house was brought down." That sentence is branded on my brain till this day. Who knows but cutting the underbrush may plant a seed which will become a "large oak!"

I would like to prolong my call, but fortunately for you have to "jot down some notes" for a lecture, the subject being "How to see and study a bit of Louisiana long moss." "What! do you presume to lecture?" Why not talk about "moss," if I happen to know some things about it not known to my neighbors? Of course, I lecture, have been at it "off and on" for thirty years. Can't you be present? It will be No. 6, series 3, this season; four more yet, and then—well —*jam satis est.*

Yours truly,

GREY BEARD.

IN THE SWAMPS OF LOUISIANA,
SEPTEMBER, 1881.

An act has been passed for the benefit of Chicago, requiring an inspection on approval by a health commissioner of plans of every house to be built, in respect to ventilation, sewerage, and plumbing. Plumbers' work must be inspected and approved. Failing to meet the commissioner's approval a building will be prohibited and plumbing work condemned.—*Ex*

Selections.

SOME REMARKS ON DESICCATED BLOOD.—There can be no doubt as to the desirability of nitrogenized food in a concentrated form, which is easily assimilated by the system and is therefore readily retained by a weakened stomach, in the treatment of wasting diseases and especially in those cases of phthisis, syphilis and cancer, in which there exists a difficulty or even total inability of deglutition. It is here that we require an article of food which shall be so constituted that it can be taken up by the system and utilized for the nourishment of the tissues, without necessarily going through the process of gastric digestion, but which may be absorbed directly either by the mucous membrane of the large intestine, as in cases where it is necessary to feed the patient by nutritive enemata, or by the skin or finally by the mucous membrane of the respiratory tract.

For a number of years past I have experimented with and used the different extracts of beef and malt as they appeared in the market, with variable results in the treatment of laryngeal phthisis complicated with dysphagia, and have lately been induced to try a new preparation called desiccated blood. The first case in which I used the preparation was one of general debility and want of tone, and one in which ordinarily I would have given cod liver oil and beef extracts. The desiccated blood seemed, however, to meet all the requirements, and the patient is apparently improving under it. Two other cases which came under my care at about this time, one a case of phthisis with extensive ulcerations of the epiglottis, making deglutition extremely painful, and the other one of syphilitic ulceration of the larynx accompanied also by dysphagia, promised to be good subjects to observe the action of desiccated blood in. I accordingly ordered for each an injection into the rectum of one drachm of the blood dissolved in the requisite amount of salt and water, four times a day, while at the same time I ordered inhalations from the steam atomizer of a solution of one-half drachm of the blood in three ounces of the salt and water, and one ounce of glycerine in the twenty-four hours. No other treatment, except local applications to the ulcerations in the larynx, was instituted for ten days. During that time both patients did well and there was an

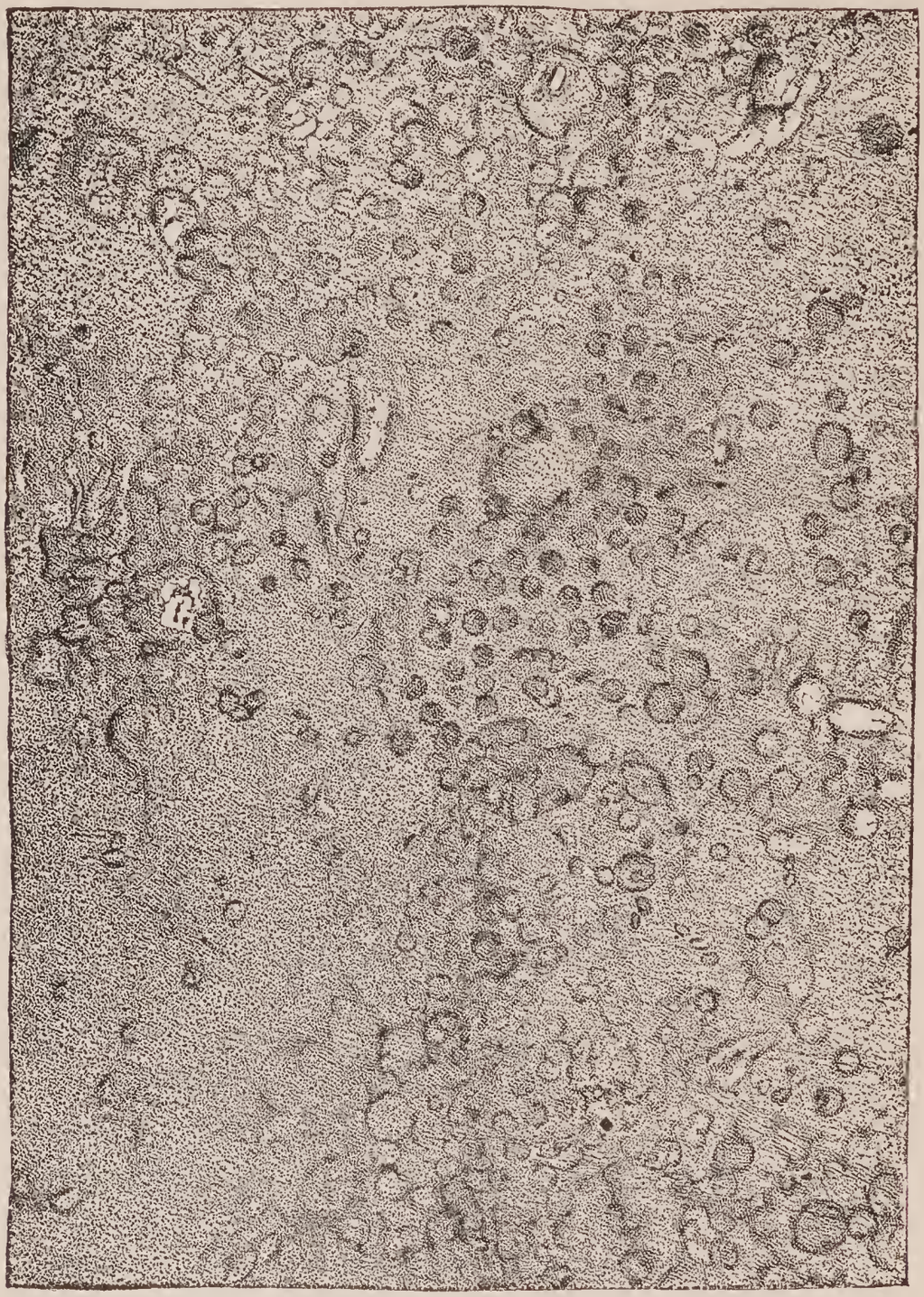


FIG. 1. Restored Blood-Corpuscles from Desiccated Blood. x 35.
(From Photograph.)

undoubted improvement in their general condition which must be solely ascribed to the absorption of nutritive elements from the desiccated blood. The use of nutritive inhalations is, as far as I know, a novel idea and I was prompted to try it by the fact, which I had observed, that butchers as a rule are strong, healthy men, but are rather poor eaters, and especially do they eat little meat. Thus it occurred to me that they might possibly obtain a sufficient amount of nitrogenized food by absorbing through the mucous membrane of the lungs and the respiratory tract, the exhalation from the fresh meat they handle.

After having thus proved the efficacy of the preparation in three cases at least, I made careful microscopical examinations of the blood, with a view to determine to my own satisfaction whether any fibrin was contained in it; whether the morphological elements of the blood had been destroyed in the process of drying; whether the albumen had been coagulated or was in a soluble shape; and finally whether the desiccated blood contained any impurities.

I first made a solution of the preparation in plain water (six drachms to five ounces) and from this prepared a number of slides. A careful search, however, for fibrin bands aud blood corpuscles was altogether fruitless, and the field of the microscope was filled with granular masses floating in a slightly colored fluid, the constituents of which could even under the higher powers (1-10 immersion) not be resolved into any shape. Besides these granular masses I noticed a number of globules of various sizes which somewhat resembled small drops of oil, for which I at first mistook them, without being able to account for their presence, except that they might have been introduced during the process of drying the fresh blood. This supposition was, however, not tenable, because even after the solution, from which the specimens had been prepared, had remained quiet for twelve hours, no oil could be detected floating on its surface.

I next made a solution of the dried blood according to the formula devised by Dr. J. G. Richardson, of Philadelphia, which is to dissolve dried blood in a solution of common table salt in distilled water of the strength of fifty-six grains to the pint. From this solution also a number of slides were prepared, and on examination I experienced no difficulty in finding a large number of blood corpuscles in the field of the microscope. They were of the average size

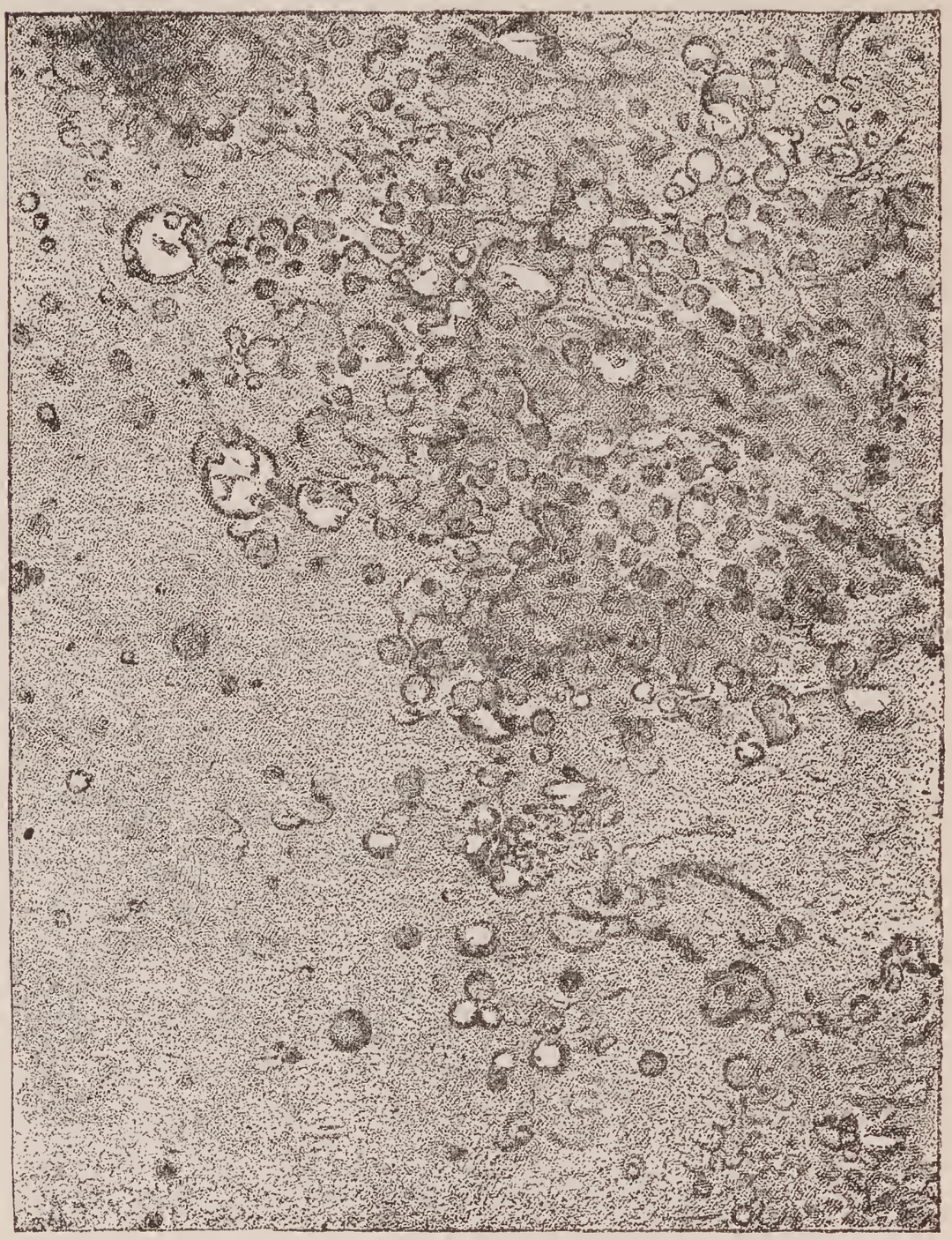


FIG. 2. Globules of Albumen Resembling Oil Globules. From a Specimen of Desiccated Blood. x 350. (From Photograph.)

of the corpuscles seen in fresh ox blood, but they had to some extent lost their color, so that they appeared paler than normal, and made it somewhat dificult for me to obtain a micro-negative of sufficient density for printing. (See fig. 1). Most of them were round, but I saw also a number which were crenated and distorted in shape. I again noticed the globular bodies resembling oil globules, and they appeared to be about twice the size of the red blood corpuscle, although some were larger and others smaller. (See fig. 3). With a view to determine whether they were oil or not I introduced various coloring solutions under the cover glass of the specimens and found that these globules were brightly stained by most of the aniline colors but not by carmine or indigo, thus proving them to be something else than oil globules.

In this second set of specimens I noticed in one or two instances a few bands of fibrin (fig. 3) and some extraneous matter in the shape of dust, both in very minute quantities.

I next made a solution of the dried blood in some artificial gastric juices, and after it had remained in an incubator for four hours, I prepared specimens from it for microscopical examination. In these I found no trace of my blood corpuscles, but the field of the microscope was filled with a brownish amorphous mass containing a few minute granules. In none of the specimens examined thus far had I been able to discover any flakes of coagulated albumen.

Finally, in order to find, if possible, the origin of the globular bodies whose nature I had not been able to determine, I placed the thinnest flake of dried blood I could pick out, upon a slide, and after applying the cover glass, examined it under the microscope. Nothing was visible but a dark mass with here and there a faint suspicion of the outline of a blood corpuscle. I then allowed a drop of the salt solution to run under the cover and watch the gradual solution of the flake. Thus I saw how little by little small masses were loosened from the large flake, and in them the outline of the blood corpuscles became distinctly visible, and these were held together by a straw colored amorphous stroma. Presently I noticed that a large globule loosened itself from this stroma, becoming subdivided into smaller ones, in which I recognized the same globular bodies seen in the other specimens. Thus I suspected that they were globules of albumen which had not been entirely dissolved by the salt solution,

FIG. 3. Restored Blood-Corpuscles. Bands of Fibrine and Globulus of Albumen. x 350. (From Photogragh.)

and this suspicion became confirmed when I found them to be opaque after the slide had been held for a few moments over the flame of a spirit lamp.

To sum up the results of these observations, I found that the desiccated blood contained very little, if any, fibrin ; that the blood corpuscies could be restored to their original size and shape; that the albumen contained in it was in a soluble form ; and that there was no extraneous matter present except a small amount of dust.

Thus it will be seen that on theoretical grounds this preparation deserves extended trial in all cases where gastric digestion is impaired or impossible, for if a solution of it is absorbed by the mucous membrane of the bowels and the respiratory tract, as I have strong reasons to believe that it is, and is thus introduced into the system without having undergone any chemical change, as would be produced by the action of gastic juice, we will have a species of transfusion of ox blood into the human system. Whether the morphological elements, the blood corpuscles, as such and in the normal condition, can be taken up by a healthy mucous membrane I am not prepared to say, but even if they are not absorbed, the albumen in a state as it is found in healthy blood and the salts of the blood certainly can be absorbed and thus must necessarily aid in the nourishment of the tissues.—Carl Seiler, M. D., in *Therapeutic Gazette.*

Claims of the Microscope.—It is true that microscopy is a science, and, perhaps, that truth deters many a young medical man from putting himself in a position to see nature and understand what he reads.

He entertains the idea that a microscope costs a fortune, and in order to understand it, he must possess an extraordinary genius, and devote all his time to it to be able to achieve anything in the line of microscopy—all of which is false, and we wish to remove, as far as possible, these erroneous and damaging impressions. Ordinary intelligence, with a determined purpose, and a few dollars, is what is needed.

Want of time is the excuse of many, and these men are too frequently found on a dry-goods box at the corner of the street, or

some frequented place, either listening to, or telling, stories of questionable purity for hours together, and yet they have no time to spend with the microscope.

"Haven't the money to spare" is another cry we frequently hear. Watch and see if you do not misappropriate money enough annually for follies—for that which is not bread—for that which profiteth not. To be plain, we mean for drinks which becloud, blights, enfeebles and ruins, also the accursed weed that contaminates, disgusts and enslaves. Open your eyes. Take a pencil and make your own mathematical calculation, and see if you have not willingly spent more time and money for that which is worse than useless than the majority of first-class microscopists have in making themselves such.

We do not desire to enter the *morale* of the question, nor the finance, and further than to tear off the flimsy gauze, so that all may see for themselves whether it be a reality or a mere phantom. A word to the wise is sufficient. Cease to do evil; learn to do well. Save your money; economize your time; become a microscopist; strike boldly for the front of your profession.

To become a diagnostician you must become a microscopist. We will give two simple, but practical cases from Bennett's Clinical Lectures, p. 76:

A child was supposed to be affected with worms, because it passed in abundance yellowish shreds, which, to the naked eye, closely resembled ascarides. All kinds of vermifuge remedies had been tried in vain. On examining the shreds with a microscope, I found them to consist of undigested spiral vessels of plants; and they ceased to appear when the vegetable broth used as food was abandoned.

An individual was supposed to be laboring under dysentery, from the frequent passage of the yellow pulpy masses in the stools, accompanied with tormina and other symptoms. On examining these masses with the microscope, I found them to consist of undigested potato skins. On inquiry it was ascertained that this person had eaten the skins with the potatoes. On causing these to be removed before dinner, the alarming appearance ceased, and the other symptoms also disappeared.—*Western Medical Reporter.*

Editorial Department.

IS A "FAMILIAR, COLLOQUIAL STYLE," INELEGANT AND UNDIGNIFIED?

THE above question forces itself upon us after a careful reading of an extended editorial in a late number of the *"American Monthly Microscopical Journal."*

Having had occasion to know something of the spleeny nature of the editor of that journal and having a desire, as far as possible, to live at peace with our neighbors, we wrote Mr. Hitchcock a candid letter before the first number of THE MICROSCOPE was issued, telling him of our intentions, of the field our journal would occupy, etc., and also expressing the hope that no jealousy would arise between us, that our fields were distinct and separate, and offering to give mutual aid to our enterprises.

The reply to this letter was eminently satisfactory and would be highly interesting to our readers, but we cannot reveal its assurances as the letter was written in all confidence.

This letter, written to Mr. Hitchcock, was the only letter of this kind written to any editor or publisher before the appearance of our journal. Mr. Hitchcock must have been familiar with our "style" long before this, for we occupied a number of pages of his Quarterly, (see: Study of one of the Distomes; Origin and death of the red blood-corpuscles, etc.) He must have known, from this, to some slight extent what to expect from us editorially. Therefore, there is no excuse for his writing us such a private letter as he did and then printing as an editorial, matter contradictory.

While Mr. Hitchcock charges us with nearly everything, he cannot accuse us of plagiarism, while we do most decidedly charge him with appropriating so nearly, the title of Mr. Phin's journal that he often gets credit where credit is not due. Copying so closely the title of this established journal has largely given to him what success he has had.

The difference between an "American Microscopical Journal" and an "American Journal of Microscopy" is truly a microscopic one. We shall expect in a few years, after Mr. Hitchcock's monthly has followed his quarterly, that a new bi-monthly journal will be

started by him, with the slightly changed title of an established journal, as follows: "The Microscopist, and his relation to physicians and pharmacists."

During the two years of his monthly, have his readers seen illustrations to compare with the "sections of ipecac" or with the beautifully executed lithographs of the "commercial fibres" and "triple-phosphates?" Compare these with his figures of the "adulterations" which an eminent botanist has assured us are "so poorly engraved that they are practically worthless." We assure our readers that we are not paying money out of pocket when we give these fine wood-cuts and lithographs but that already our journal is on a paying basis. All this comes from our "familiar, colloquial style." "Facetiæ" will *not* be omitted, and never will be so long as we can find a doctor or a druggist who likes a joke even if it is on himself. We never hope to give a witticism that would make our critic laugh. "Too hard a task for me, by far."

Again must we disappoint you, for the "tone" of our journal will not be changed, as we have no desire either to displease our subscribers or to lower their number to the size of our critic's list.

We state, again what we have often said before, that "angle of aperture" and "a standard measurement" are not the themes to be discussed in this journal, but rather, practical helps to the hard-working physician and pharmacist. While it is true that, privately we devote a large part of our time to both theoretical and technical study, yet only the practical and useful shall appear in this journal.

We quote from our first editorial. "In time, then, we hope, through the columns of this journal, to show to the professions of medicine and pharmacy that the microscope is not altogether an expensive plaything or an instrument to theorize about but that solid, practical good, and invaluable help may be derived from its use."

C. H. S.

HAVING had a large number of letters from parties all over the country asking the relative merits of the various microscopes in market, we reply to them, and say to all our subscribers as well, that we have personal reasons for knowing that each dealer who advertises with us is responsible and honest. Further, if you wish to

buy a microscope, first of all send to each of our advertisers for a catalogue and price list, then study which style you prefer, and when you have decided with which house you wish to deal, if you choose, you may make your order through us, and we will give you the instrument at the same rate the dealer will, that is, we will give you our experience in buying. In no case will we order from a house who does not advertise with us, and in every case will we order from the house you choose. Again, in no case will we choose the house for you, and, in every case, having chosen your dealer, as Grunow, Pike, Reynolds, etc., will we advise with you as to the best instrument they offer for your particular wants and for your means.

DR. P. Grawitz in "Arch. Path. Anat. Physiol. (Virchow), vol. xxxii, (1880) pp. 355—376" has shown a remarkable similarity, in all essential points, between the dermatophytes which accompany different infections diseases, and the milk-ferment, *oidium lactis*, making them almost identical.

The two most widely distributed and best known of the fungi in question, *aspergillus glaucus* (the mould found generally on canned fruit and preserves) and *penicillium glaucum* (the growth on mouldy bread) each occur in two different forms which present no morphological difference, but which differ very widely in their physiological properties. The one (saprophytic) may be introduced into the blood of the higher animals without showing any disposition to germinate; the other (parasitic) germinates and spreads with the greatest facility. Both forms may be produced from the same original item, and each form may be reproduced through from twelve to twenty generations, and may then give birth to the other. The malignity of the parasite depends on the entrance of the spores into the the blood, when they germinate, and then pass with great rapidity into the various tissues of the body, where they cause local necrosis.

IT is impossible to predict, at this time, some of the wonderful things that will develop from Dr. Hahn's discovery of fossil organisms in meteorites. It has started a lively discussion, and we await with intetest the outcome of the matter. A large number of scien-

tists have availed themselves of the opportunity of examining Dr. Hahn's microscopic preparations, and we are told that in this case "seeing is believing," and all go away satisfied with the genuineness of the discovery. Charles Darwin says "the discovery is one of the most important." Dr. Hahn visited the great zoölogist in order to show him his preparations, and as soon as Mr. Darwin had examined one of the finest specimens, he started from his seat and greatly excited exclaimed, "Almighty God! What a wonderful discovery! Wonderful!" After thinking a few moments in deep silence, he added, "Now reaches life down!" This last sentence is interpreted to mean that now, after this discovery, we have the proof that organisms can reach our planet from celestial space.

THE Trichinoscope, recently brought out by the Bausch & Lymb Optical Co., consists of two metal plates hinged together at one end, and so arranged that they may be powerfully forced together by means of the screw at the other end. A compound microscope may be used in connection with it, or a simple microscope so arranged that it may be moved over every part of the suspected meat. It is so simple that a boy could learn to use it, and the price, $3, so low that it is within the reach of all.

WE owe many thanks to the editor of the *American Journal of Microscopy* for his friendly notice of our journal, and for the good words he has spoken in our behalf. This journal, now in its sixth year, is always well filled with sound practical knowledge. The editor now offers the fourth edition of his "Practical Hints on the Use of the Microscope." Address P. O. box 2,852, New York City.

JUST as we go to press we are informed of the death of the eminent Charles A. Spencer, of Geneva, N. Y.

His name and fame are familiar to scientific men on both continents. Mr. Spencer died at his residence at Geneva, Sept. 28th, æt. 68 years. We shall have something to say concerning the life of this self-made man in our next issue.

Items.

The person who eats oleomargarine is sure to get fat—of course.—*Ex.*

It was a doubting patient who said, "Doctor, are these pills square?"—*Ex.*

And now they are talking of making an excellent substitute for butter out of cotton-seed oil.—*Ex.*

From the prices that some physicians charge one can readily imagine that high heals are fashionable.—*Ex.*

A Washington chemist finds that sour milk, thickened with melted tallow and lard, was used in samples of ice cream submitted to him.—*Ex.*

A man advertises for competent persons to undertake the sale of a new medicine, and adds that "it will be profitable to the *undertaker.*" No doubt of it: most of them are.—*Ex.*

Out of 3,216 tubs of butter recently arrived at Glasgow from the United States only 1,467 were pure; 1,750 containing oleomargarine and butterine.—*Ex.*

"Do you know where I can get room to store a load of salt?" asked a countryman of a Boston clerk. "Perhaps my father can accommodate you," was the reply; "he has plenty of saltrheum on his hands."—*Ex.*

The Illinois legislature has aimed a blow at the manufacture of oleomargarine by the passage of a law making the sale of impure or adulterated butter a finable offense.—*Ex.*

The 20,000,000 cinchona trees planted in Ceylon in 1880 are expected to yield in six years 10,000,000 pounds each year, but it is believed the demand will fully keep up with the supply, so that prices will not decline.—*Ex.*

The Best Medicines.—Longfellow says:

"Joy, temperance, and repose
Slam the door on the doctor's nose."—*Ex.*

SCARLATINA FROM INFECTED MILK.—At Halifax an epidemic of scarlet fever has been traced to infected milk. Of the eighty-two families supplied by a certain milkman, forty-five were attacked. It was discovered that the milkman had five children ill of the disease at the time.—*Med. Times and Gazette.*

A doctor who had continued his visits on a wealthy lady for an inordinate time after convalescence had set in, was somewhat surprised one day, at being told by the servant that madame could not see him that day as she was ill.—*Ex.*

QUITE ANÆSTHETICAL.—A famous surgeon advises one of his patients to undergo an operation. "Is it very severe?" asks the patient. "Not for the patient," says the doctor; we put him to sleep; but very hard on the operator." "How so?" "We suffer terribly from anxiety. Just think, it only succeeds once in a hundred times."—*Paris Figaro.*

The Pennsylvania state microscopist, Prof. Lehman, in a lecture at Philadelphia, declared that most of the liquor used is a humbug, and to prove it, took the necessary ingredients, and in a few minutes had concocted, in the presence of his audience, a firstrate article of 10-year-old brandy.—*Ex.*

Halcyon days for the bald-headed fraternity are come at last. A London capillary surgeon announces that he will replant barren fields and make them flourish like weeds in a turnip patch. First, he administers a "bald bolus," which is taken to produce composure. Then the scalp is removed piece by piece, and a new one is grafted on meanwhile.—*Ex.*

The Cincinnati *Gazette* takes a gloomy view of the bibibles in that city. It writes: But are liquors poisoned? Of course they are. Four-fifths of all the liquor drank in Cincinnati, including wine, beer and cider, are poisoned. And these poisons are not confined to common drinks, such as whisky and beer; they extend to the aristocratic drinks that are more costly. The French wines are nearly all adulterated, and contain poison. They are not real wines, but imitations.—*Ex.*

When I reflect on the immunity of hard-working people from the effect of wrong and over-feeding," says Dr. Boerhaave, "I cannot help thinking that most of our fashionable diseases might be cured *mechanically instead of chemically*, by climbing a bitterwood tree, or chopping it down, if you like, rather than swallowing a decoction of its disgusting leaves."—*Ex.*

Copal Varnish.—Pale copal varnish, of the consistency of oil, is recommended as a substitute for Canada balsam. Mr. Derby writes in the *Journal* of the Queckett Microscopical Club, that he finds it much pleasanter to use than Canada balsam; it makes no bubbles, which sorely try beginners working with balsam; it has nearly the same refractive index as balsam. He has mounted specimens in copal, dispensing with the cover glass altogether. The varnish dried rapidly if slightly heated, and is hard enough to stand wiping and rubbing with a soft brush.—*Medical Herald.*

Coloring Living Cells.—M. A. Certes details in the *Comptes Rendus* a series of interesting experiments, which seem to demonstrate the possibility of staining living cells. He uses a weak solution of cyanin in serum (which is a better solvent than water). Infusoria are stained a pale blue, and live for 36 hours. White blood-corpuscles of the frog, stained with cyanin and kept for 24 hours in a moist chamber, still exhibit amœboid movements. Cyanin tinges the fat granules of the protoplasm, it has no effect on the nucleolus, cuticle, vacuoles or cilia.—*Medical Herald.*

Origin of Yellow Fever.—Dr. Manuel Da Gama Lobo of Rio Janeiro, physician to His Majesty, the Emperor of Brazil, has been prosecuting some microscopic investigations relative to the land origin of yellow fever. He has found at Vera Cruz, Mexico, and Havana, Cuba, sufficient evidence to warrant him in stating that these localities are fruitful sources of a poison which causes the disease. The toxic agent is derived from a species of infusoria, the *opunsia Mexicana*, which belongs the family of *bacillarum.—Ex.*

Curiosities of Adulteration.—A school-master sends the following singular statement to the *London Lancet:* "I am at the head of a town school, and a short time back gave Breadmaking to a class

of boys as a subject for an essay. One of the essays began in school-boy English : 'The first thing in bread-making is to boil the potatoes, and then you must peel them and mash them carefully. Then you must mix them with a little water, and set them in a warm place till they begin to ferment,' etc., etc. Oddly enough flour was not mentioned in the course of the essay. The boy's father is a baker.—*Ex.*

Butter 3,000 Years Old.—A sample of Irish bog butter, probably 1,000 years old, on analysis, yielded the following results : Volatile fatty acids, calculated as butyric, 6 per cent.; soluble fatty acids, not volatile, 42 per cent.; glycerole, minute traces. The insoluble fatty acids contained 9 per cent. oleic acid and 91.0 per cent. stearic and palmitic acids. An older sample of ancient butter was taken some time ago from an Egyptian tomb. It dates from about 400 or 600 years before Christ. It was contained in a small alabaster vase, and had apparently been poured in while in a melting state. In appearance, color, smell and taste it corresponds closely with slightly rancid butter. Analysis showed that the sample had not undergone any notable decomposition.—*Ex.*

How to Distinguish Natural & Artificial Butter.—Dr. G. C. Wittstein, in an Austrian pharmaceutical journal, explains how to distinguish cream butter from "ox butter" by means of the microscope. Place a small piece of the butter upon an object-glass, spread it out by means of a cover-glass, and observe it under a power of three hundred to four hundred. If it is pure butter the whole field is filled with extremely fine globules, which are entirely destitute of any approach to crystalline form. If the butter is artificial, or a mixture of both, the field presents numerous angular or acicular particles between the globules. These crystalline particles are derived, no doubt, from the stearine which forms part of the beef-tallow in artificial butter. Lard does not show any such crystalline particles.—*Ex.*

Filaria in the Blood.—An interesting letter from P. Manson, M. D., who has been studying the filariæ in the blood of two Chinese lads, to Dr. T. Spencer Cobbold, is printed in the *Journal of the Quekett Club* for July. The filariæ are long, hair-like worms

belonging to the Entozoa. They are found in the blood of persons who may apparently enjoy good health at the time. They seem to occur quite frequently in China. A most mysterious phenomenon connected with these organisms is their periodicity. Between four and six o'clock in the afternoon the filariæ began to appear in the blood, their number increases until midnight and then diminishes until nine or ten o'clock in the morning, when they have entirely disappeared. This daily periodical recurrence of the worms seems to be quite independent of the habits of the patient, and has not yet been explained.—*American Medical Journal.*

Barley and Barley Flour.—The best tests for the genuineness of barley, says the *American Miller*, are its color and its freedom from grit and insects. The microscope will lead to the detection of any cheaper grains if mixed with it. Barley is rarely adulterated, though it is said to be extensively used for the purpose of sophisticating wheat, annato and licorice. The chief difference between barley flour and wheat flour is not in the albuminoid bodies, but in their character. If you take barley flour and knead it with water, you will be able to see after watching for some time a small quantity of crude gluten left, which would render barley flour very inappropriate for making a good loaf of bread. Barley bread is heavy, sticky and leathery, much like wheat flour when it has been baked in the oven. However, the Greeks are said to have trained their athletes upon a barley diet.

Moist Chamber.—Prof. Strassburger's moist chamber is described in the *Journal de Photographie et de Microscopie*, as follows: It consists of an ordinary slide upon which is placed a ring of pasteboard, moistened with water. The object which is to be observed and kept alive is placed in a drop of water on a cover-glass and inverted over a pasteboard chamber; the cover is made to adhere to the cell by pressure. The evaporation of the drop of water is greatly retarded, if not entirely prevented, so that in this simple manner Prof. Strassburger has kept *Spirogyra* in copulation alive for several days. By moistening the pasteboard from time to time the cover will remain attached indefinitely.

The drop of water can readily be covered with a small and thin

glass before inverting it over the cell, just as in the slide described by Mr. J. Deby.—*Monthly Microscopical Journal.*

Adulteration of Food.—The *Telegram* of Toronto gives the following in reference to this subject: There appears to be a good deal of adulteration of food carried on, principally milk, coffee, tea, spices and butter. Out of 226 samples analyzed by Prof. Ellis, he found that fifty-eight were adulterated. Many of the adulterations were harmless, the object being to make the quantity weigh heavier. In the case of milk, it appears that the practice of watering it is very common, and there really seems no remedy left for the abuse but to require the milkmen to drive their cows around to their customers' doors, as they do in Cuba, and milk the requisite quantity in the presence of the purchaser. Those good people who have been paying for coffee, appear to have been drinking chicory, while the tea drinkers have been regaling themselves with Prussian blue and other deleterious stuff. Altogether, the public seem to be badly used. There is water in the milk, chicory in the coffee, Prussian blue in the tea, flour in the cloves, an excess of salt and water in the butter, flour and cassia in the cinnamon, and flour and termeric in the mustard; the gas is bad, the bread is frequently of light weight, the coal is often short, the coal-oil is poor, many of the fowls have their crops filled with stones and gravel to make them weigh more; in short there is cheating all around and nobody seems to be getting value for his money. It is hardly to be wondered at that the Chinese are talking of sending missionaries over to convert us.—*Sanitary News.*

The Immortality of Bacteria.—Grace Calvert had previously shown that bacteria can live in strong carbolic acid, and in short, in almost anything. It is not a little surprising to find these remarkable organisms not only living, but flourishing in such gases as a sulphurous oxide, carbonic anhydride and oxide, all highly poisonous and irrespirable by animals. As Prof. Frankland observed, a question of considerable importance arises out of the experiments narrated, as to whether the germs of infectious diseases are not similarly endowed with a power of resistance to ordinary influences. We look with some degree of curiosity

for Dr. Tidy's opinion of Mr. Hatton's experiments, and wonder whether this chemist after having seen that bacteria withstand the action of cyanogen, sulphurous acid, and other deleterious gases, will adhere to his statement that the run of a mile or two of sewage of contaminated water, will ensure the destruction of any amount of bacteria, cause organisms most tenacious of life, by endosmosis, to burst their protoplasmic envelope, and commit a sort of "happy despatch" for the special security of human beings in general. The idea is too preposterous to be entertained for a moment.—*Medical Press and Circular.*

Poisonous Articles of Food.—The Committee on Epidemic diseases of the House of Representatives secured a mass of convincing evidence of dangerous food adulterations in this country. From one of the reports submitted, made by a chemist of Chicago, we make the following extracts:

At the the request of a highly respectable citizen of Chicago, I have examined fourteen brands of sugar, bought, as I understood, in this city, some granulated, some white, some colored, some coarse, and some fine. I tested them thoroughly for impurities. In twelve of the samples I found tin in the form of a chloride, an active poison. I have examined several syrups, made essentially and entirely of glucose, and found in them chlorides of tin, calcium, iron, and magnesia, and in quantities which made them very poisonous. In one case a whole neighborhood was poisoned, and I was told of one death. I have in several cases found sugar of lead in vinegar. I have had large experience in the analysis of colored poisonous articles of clothing, being employed by one of the largest dry goods firms in this city. I examined, I think, sixteen samples, and nearly all of them were poisonous. I have also analyzed for other parties. In one case a child nearly died from wearing colored stockings. I have examined a large number of specimens of oleomargarine, and have found in them organic substances in the form of muscular and connective tissues, various fungi and living organisms which have resisted the action of boiling acetic acid ; also eggs resembling that of the tapeworm. I have them preserved to be shown to any one who desires to see them. The French patent under which oleomargerine is made requires the use of the stomach of pigs or sheep. This is, probably the way the eggs get in. I have specimens of

lean meat taken from oleomargarine. There can be no question that immense amounts of oleomargarine are sold and used as pure butter. I regard it as a dangerous article, and would on no account permit its use in my family. Much credit is due the *Sanitary Engineer*, published in New York city, for its frequent and energetic exposures of food and drug adulterations.—*Ex.*

Food Adulterations.—*The Medical Bulletin* for May gives us some important information on the subject of food adulteration. It gives us the experience of several scientific gentlemen as to the criminal adulterations of some of our common articles of diet. It says:

Prof. S. W. Johnson, Professor of Chemistry in the Sheffield Scientific School, Yale College, has, speaking in the presence of the leading scientists of the United States, at Saratoga, in September last, said, "I find, among other adulterations named, the following as *liable* to be found: Bread, with alum and sulphate of copper; yeast, with alum; baking powder, with alum, terra alba, plaster of Paris, whiting and kaolin; milk with a variety of articles; cheese, with potatoes, beans, oleomargarine, vermillion, red chalk, sulphate of copper, arsenic, and corrosive sublimate; lard, with boiled starch, alum, and quicklime; confectionery, with chromate of lead, vermillion, Prussian blue, copper and arsenic; pickles, with sulphuric acid, and verdigris; mustard, with yellow ochre, and chromate of lead; vinegar, with sulphuric acid, arsenic, and corrosive sublimate; coffee, with roasted acorns, spent tanbark, logwood, mahogany, sawdust, and burnt liver of horses; tea, with a great variety of articles."

Dr. R. W. Piper, of Chicago, Ill., detailing his examinations of various articles, says that he found in oleomargarine "organic substances in the form of muscular and connective tissues, various fungi, and living organisms which have resisted the action of boiling acetic acid, also eggs resembling those of the tapeworm."

Prof. George A. Mariner, also of Chicago, Ill., found that out of fourteen brands of refined sugar twelve contained chloride of tin, an active poison; in syrups made essentially from glucose he found chloride of tin, calcium, iron, magnesia, and in quantities which made them very poisonous; he found sugar of lead in vinegar; and lead and copper in pickles; he found alum in baking powder in place of cream of tartar. He says, "I have come to expect adulteration,

and to fear dangerous adulteration, in almost every article of the grocery kind."—*Ex.*

A New Method of Bleaching and Washing Sections.—Microscopists are indebted to Sylvester Marsh for the following excellent process, the description of which first appeared in the *English Mechanic:*

Two wide-mouthed bottles, each of about two ounces capacity, are procured. Corks are fitted to them, and the corks are connected by a short piece of glass tubing which is bent at each end, and passes down through the corks, passing just through one cork and far enough through the other so as to almost touch the bottom of the bottle when the cork is inserted. A channel is to be made in the side of the cork carrying the long arm of the tube, and one of the bottles is then filled about three quarters full of filtered rain-water, and in this the sections to be bleached are placed. In the other bottle a sufficient quantity of chlorate of potash in crystals is placed to just cover the bottom, and then a drachm or so of strong hydrochloric acid is poured upon them. The corks are then placed in the bottles, being particular to put the cork carrying the long arm of the tube in the bottle containing the sections. The yellow vapor of chlorine (or, rather, of euchlorine), immediately begins to be evolved, and passes over through the tube into the water containing the sections. When the water becomes saturated with chlorine, the excess rises and escapes through a channel in the cork. It is Mr. Marsh's practice to arrange the apparatus for work at night, and to set it out of doors in a covered place, in order to avoid annoyance from the escaping fumes of chlorine.

To wash the sections after bleaching, a bottle is taken, similar to the others, but having a small aperture filed in the side at the shoulder. The bleached sections are placed in the bottle and covered with filtered water. A small funnel is then fitted to the cork, and the neck of the funnel is continued to the bottom of the bottle by a piece of fine rubber tubing, the tube being carried to the side of the bottle opposite the aperture. A sheet of filtering paper being placed in the funnel, the bottle is placed beneath a water tap, and a gentle stream of water allowed to trickle into the funnel continuously. A constant circulation of water is thus maintained in the bottle, the discharge being through the orifice in the side. As in

the case of the bleaching, the apparatus is set to work at night, and in the morning the section will be found to be thoroughly washed. The advantages claimed by Mr. Marsh for this method are that the sections are effectually bleached without being subjected to the destructive and disintegrating action of the chlorinated soda solution; neither will the sections suffer from the deposit upon them of a scum of carbonate of lime, as frequently happens in the use of the ordinary bleaching fluids. The apparatus is easily constructed, and the results are very satisfactory.—*American Microscopical Journal.*

ADULTERATION OF BREAD AND MILK.—The fact that these two staple articles of food are often largely adulterated, is sufficient reason for the enactment of stringent laws against the adulteration of food and drinks, if no other articles of common use were subject to harmful sophistication. That adulteration is much more extensively practised than is generally supposed, is unquestionably true. At the last annual meeting of the American Social Science Association, Prof. S. W. Johnson presented a valuable paper on this subject, a few paragraphs of which, relating to the adulteration of bread and milk, we quote as follows:

"Sago and tapioca originally were preparations of starch made in the Indies of Brazil, but now they are perfectly imitated on a large scale from potato and corn starch, and the imitations are every whit as good as the genuine, and being in large demand, are sold at a price that is not unreasonable.

"Next to bread, milk ranks in importance on the list of foods that are subject to adulteration. We have it on good authority that milk, after being robbed of its cream and diluted with water to cheapen it, has been mixed with sugar to sweeten it, with salt to develop its flavor, with annatto and turmeric to improve its flavor, with soda and chalk to keep it from souring, with gum, dextrin, emulsion of hempseed, boiled starch, and even pulverized brains to thicken it.

"The most common adulteration of milk is by the addition of water, and where there is no milk inspection, this, and the removal of cream, are the only usual modes of tampering with it, unless soda is added to keep sweet what otherwise might sour before it could be disposed of.

"In 1869 and 1870, Prof. Chandler, now President of the Board

of Health of New York, directed examinations of 550 samples of milk of that city. The only adulteration that could be detected was water. In 45 cases milk was seized by the police the moment when it was undergoing the process of dilution. By chemical analysis, or by the use of the lactometer (lacto-densimeter), the quantity of water added was ascertained, and the average amount found to be over 26 per cent., or, for every three quarts of milk, one quart of water was sold. It was estimated that in this way 40,000,000 quarts of water were annually peddled out at the average rate of 10 cents per quart, making 'business' to the amount of $4,000,000 per year, or $12,000 per day.

"Some one has stated, I know not how correctly, that the number of cows that not long since supplied milk to London was not enough to give to each inhabitant of that metropolis more than a tablespoonful of pure milk daily."—*Good Health.*

Reviews.

THE MICROSCOPE AND ITS REVELATIONS. By William B. Carpenter. sixth edition, 26 plates, 500 wood-engravings, pp. 882.
Presley Blakiston, Philadelphia, 1881. Price $5.50.

It is with pleasure and pride that we point to the volumes of Carpenter in our library. In this edition we notice as the frontispiece a beautiful plate of volvox, and no less than fifty new wood-engravings have been added throughout the book. Much new matter is introduced under the Bacterium group and in very many places the text has been altered. Great changes have been made in the methods of preparing, staining, mounting, and collecting of objects.

The reader finds much new matter in chapter IV and much that will go to establish the opinion that because an objective has wonderful "resolving" power when applied to the most difficult tests, it is no sign that it is the best objective for biological use. Mr. Dallinger has been able to do more with a dry $\frac{1}{35}$th of "moderate angle" than would have been possible for him to do with an oil-immersion $\frac{1}{275}$th of the same makers with far superior resolving power. Dr. Carpenter defends, better than ever, his old theory that moderate angular apertures are the best for biological work.

The chapter on the application of the microscope to Geology is very satisfactory and adds greatly to the value of this edition. Bearing in mind the changes that have been made and the amount of new matter added we must declare that those who already possess an earlier edition of this work cannot afford to be without this one, and those who have never possessed a volume of Carpenter should procure a copy without delay. We cannot pass this subject by, however, without regretting that Dr. Carpenter did not recognize more of our American instruments. He mentions but one, and that one no better than many others. A half dozen makers in this country could show better and cheaper microscopes than he exhibits. However we can easily forgive this for the many good things he has given us.

Dr. Carpenter is our highest authority on general microscopical matters and we unhesitatingly declare this to be the best book of its kind in the English language.

MANUAL OF HISTOLOGY. Edited and prepared by Thomas E. Satterthwaite M. D., President of the New York Pathological Society, Pathologist to St. Luke's and Presbyterian Hospitals, etc., in association with five writers from Boston, one from Philadelphia, one from Brooklyn, and eight from New York City. 8 vo. 198 illustrations. pp. 478. Published by Wm. Wood & Co.

The editor states in his preface the very reason that induced us to undertake the work of preparing a manual, viz., "summarizing, in concise and plain language, our present knowledge in this fundamental branch of medicine." Of the 198 illustrations, but sixty-five were prepared for this volume, and only forty are claimed as original. The first thirty-four pages are devoted to the mechanism of the microscope and to methods of work, staining, injecting, etc. Here is a work of sixteen editors, or less than thirty pages to a editor. It is this style of book making that we have always disliked. It cannot be stamped with the views of any one man, and it brings no credit to the editor-in-chief or to any one of the buried writers. It insures the sale of an extra number of copies, and in this particular the chief editor has shown business sagacity. However, there are grave histological errors, and for a work assuming so much they are inexcusable ones. The structure of the spermatozoa is that given years ago, and is not that received at the present time. Nothing is said of the "fine filament much longer than the body and connected to it by a homogeneous membrane." They are far from being as simple as "a ciliated cell." Again, on page 92 is given the method of preparing dry bone which bears on the ludicrous and seems puerile to one who has seen other methods tried, requiring one-tenth the time and giving ten fold better results. By reading the chapter on muscle one is convinced that the author either has never read Klein and Smith or has entirely ignored their teachings. The simple structure of non-striated muscle contrasts strikingly with that given by late writers.

A careful study of the book will show that in nearly every case the author is a theoretical man, telling what must exist, but avoiding the various details necessary for any one else to arrive at the same conclusions. We notice that with one exception, (Dr. Mayer) the authors fail to give the magnifying power used to produce any of their figures. The illustrations are as good as they are old with but few exceptions. When will the beautiful diagrammatic figures of Rollet and his school be abolished! The book has

no place in our literature, and here we find our best criticism. It is not complete enough to rank as a "book of reference," and its too redundant descriptions and deficient "laboratory methods" will keep it from becoming the companion of the beginning student. Great prominence is given to the bibliography, the most valuable feature of the work.

Wm. Wood & Co. have given us their usual fine clear type and substantial binding, and they have made the volume both attractive and durable.

BACTERIA, THE SMALLEST OF LIVING ORGANISMS. By Dr. Ferdinand Cohn, Professor in the University of Breslau. Translated by Chas. S. Dolley, Rochester, N. Y., 1881. pp. 30. One lithographic plate, 22 figures.

This translation is especially valuable from the fact that the translator has added notes, thus giving the very latest views of Dr. Cohn on this subject, for the author has changed some of his views since writing the original article. These changes are all given in the foot notes. Dr. Cohn is authority on this subject, and our readers will be greatly pleased with a perusal of this translation.

TRICHINÆ, HOW TO DETECT THEM, AND HOW TO AVOID THEM. By John Phin, Editor of the "American Journal of Microscopy." pp. 20, figs. 9.

This is a popular account of the habits, modes of propagation and means of dissemination of these "pork worms." It describes the new Trichinoscope recently introduced by the Bausch & Lomb Optical Company of Rochester, N. Y. See editorial. Anyone wishing a complete account of the habits of these animals with the means for their detection should send to Mr. Phin for a copy.

CATALOGUE OF THE PHÆNOGAMOUS AND VASCULAR CRYPTOGAMOUS PLANTS OF MICHIGAN. By Chas. F. Wheeler and Erwin F. Smith, Hubbardston, Mich. pp. 105. One double page map of state of Michigan, 1881. Price, fifty-cents.

It is difficult to estimate the amount of labor bestowed on a catalogue of this kind. As a work of reference it is highly valuable and the authors have spared no pains to make it thoroughly reliable.

CHART OF THE CRANIAL NERVES. By Geo. B. Ayres, M. D., Professor of Anatomy, Omaha Medical College, 1881.

This is a convenient and accurate arrangement of this difficult part of Anatomy. Address the author at Omaha, Nebraska.

CHARLES A. SPENCER.

THE MICROSCOPE

AND ITS RELATION TO

MEDICINE AND PHARMACY.

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CONTENTS.

PAGE

Original Communications.

Charles A. Spencer. By C. H. Stowell. 129
Some Hints on Mounting. By W. H. Walmsley.... 134
The Development of Starch Grains. By Geo. P. Andrews, M. D..... 143

Editorial Department.

A Reply to Mr. Hitchcock..... 148
A Fine Present..... 150
The Engraving of Mr. Spencer..... 150

PAGE

Our Next Issue..... 150
How Mr. Hitchcock can get his Pay.. 151
McAllister Lantern for Sale..... 151
New Advertisements..... 151

Selections.

Microscopy..... 152
Items..... 157
Society Proceedings..... 159
Reviews..... 160

Original Communications.

CHARLES A. SPENCER.

BY CHAS. H. STOWELL.

CHARLES A. SPENCER was born on Quality Hill, near Canastota, N. Y., in 1813. When 15 or 16 years of age he came to Canastota, and there lived until about six years ago. He moved from Canastota to Geneva, at the invitation of the Geneva Optical Co., but subsequently he separated from them, and, with his sons, paid exclusive attention to the manufacture of microscopical instruments.

Mr. Spencer was emphatically a self-made man, for he had no other preparation than that received at Cazenovia Seminary, where he graduated, and about one year's work at Hobert College.

His skill and genius, however, soon enlisted the friendship of all the more prominent and scientific men of that day. Such men as Prof. Bailey, of West Point, Prof. Henry, Prof. Bache, Prof.

Pierce, Dr. Torrey, President Barnard, Alexander Agassiz, and Prof. Wyman were among his firm friends and ardent admirers.

At 19 years of age, Mr. Spencer is described as a genteel young man of graceful appearance and studious habits; intimate with few of his years, and very reserved; seldom seen on the streets, and never around bar-rooms or public places; the people inclined to call him shiftless and idle, not knowing how he employed his time. Yet one intimate friend always knew where to find him—in the chamber of his father's house. Here, tables, shelves and drawers were covered and filled with the greatest variety of philosophic and electric apparatus. Here was where the "idle" boy was working away, with habits of the most untiring industry. Not having the means to purchase the tools and apparatus he needed, he set about to construct them himself. When only 12 years of age he ground and finished a lens of moderate quality. By reading various articles on optics, he became deeply interested in the construction of telescopes and microscopes; although he always declared, in those early years, that he would under no circumstances become a mechanic choosing rather a professional career.

In a short time he made a number of compound microscopes, one upon the refracting principle of Prof. Amici, and also Gregorian and Newtonian telescopes, with specula of 6 and 8 inches in diameter. How well he succeeded in the manufacture of telescopes is answered by referring to the one at Hamilton College, which possesses many very superior qualities, and which has, in the hands of Prof. Peters, brought the institution a world-wide fame. The discovery by Goring, of the effects of angle of aperture, awakened the deepest interest in the mind of young Spencer. He became aware of the superior manufacture of optical glasses by Faraday, Fraunhaufer and others, and over a furnace of his own construction he would work, frequently 18 consecutive hours, trying to improve upon the desirable qualities of his glass. In this, too, he was at last successful, and was enabled thereby to make great advance upon his previous efforts. We have the first edition of "Queckett on the Microscope," and from page 440 we quote:

"*Navicula Spencerii.*—Early in the present year, Mr. Matthew Marshall received some specimens of this species from Professor Bailey, of West Point, N. Y., who stated that an object glass, constructed by a young artist of the name of Spencer, living in the back

woods, had shown three sets of lines on it, when other glasses of equal powers, made by the first English opticians, had entirely failed to define them."

This test, named after Mr. Spencer, was sent to him by Prof. Bailey, who doubted whether he could make a glass that would show the longitudinal markings, as Ross's objective in Prof. Bailey's hands could show them. Spencer applied the test to one of his objectives, and found not simply the longitudinal lines, but also, as Queckett says, "lines which are in reality dots, and arranged so as to exhibit both transverse, longitudinal, and even oblique striae." With great surprise and admiration Prof. Bailey admitted the wonderful discovery, and the test well bears the name in memory of it. Mr. Spencer was the first, also, to resolve the markings on the *Gramatophora Subtilissima*.

At this time Spencer's attention was given to a careful theoretical and practical examination of the truth of the published statement that "135° is the largest angular pencil that can be passed through a microscopic object glass." This statement of Mr. Ross's was soon proved incorrect by the production of a $\frac{1}{12}$ in. objective, having an angle of 146°. This must be regarded as Spencer's first great triumph. It was followed by an increase of the angle of all the higher powers, until in 1851 he made a $\frac{1}{16}$ of "as near 180° as can be obtained." We have taken some care to ascertain the truth of the following statement, and we have every reason to believe it is correct, viz., that this identical $\frac{1}{16}$ is now in our possession. It was purchased by Prof. Alexander Winchell in 1855, and exhibited by him before the American association for the advancement of science, which met in Albany in 1856, and by the experts there assembled declared to be the finest objective in this country. When this glass came into our possession a number of years ago, it was found to show a crack running across about ⅓ of the field. Upon returning it to Mr. Spencer, he declared that he could make a new one nearly as cheap as he could remedy this, "for it is one of my first glasses * * *" he said, and the formula was so different, and the injury so bad, that he returned the glass, and took an order for a $\frac{1}{18}$. Two-thirds the field of this $\frac{1}{16}$ will show nearly as clear and distinct an image to-day as his more recent $\frac{1}{18}$.

In 1843 Hamilton College conferred upon him the degree of Master of Arts.

In 1847 Mr. Spencer visited New York City, and while there met Dr. C. R. Gilman, who had a microscope constructed by Chevalier, of Paris. Mr. Spencer said he could make a better instrument, and at once was told to try.

When the instrument was complete, and Spencer was on his way to deliver it, he stopped at West Point to visit Prof. Bailey, at that time the first microscopist in America. The instrument had a safety-stage, two eye-pieces, and three objectives—a $\frac{1}{3}$, a $\frac{1}{7}$, and a $\frac{1}{16}$ inch, a polariscope and a Lieberkuhn for the $\frac{1}{3}$ inch. With this instrument Prof. Bailey resolved the *Navicula Spencerii*, noticed in our quotation from Queckett. Prof. Bailey was able to resolve markings he had never succeeded in doing with any other objective. He pronounced the instrument "decidedly superior to Chevalier's." Spencer said that when he saw how easily his objective resolved the *hippocampus*, he almost instantly lost his reverence for the "English test object *par excellance*."

Thus success followed success, until with a $\frac{1}{4}$ he was able to resolve the 19th band of Nobert's test plate with ordinary daylight illumination, and also with artificial light.

A number of years ago a naturalist, intending to travel abroad, concluded to take some of Mr. Spencer's glasses with him, and see how they compared with the best of those in Europe. He first called upon Mr. Ross, of London, who praised them to the extreme. Chevalier, of Paris, at that time the best maker in Europe, compared the glasses with his own, and earnestly proclaimed "this is one immortality," meaning the maker was immortal. Prof. Amici, of the University of Genoa, declared that Europe had never surpassed such work, and he questioned if it ever would. Thus did the most competent judges of Europe acknowledge his superior gifts and talents, and that too at a time when, in his own country he was quite unknown, and certainly unappreciated.

Our readers are familiar with his later triumphs, and his friends in this country were not surprised when, at the Paris Exposition, he received the highest reward, a magnificent gold medal.

For several years, owing to failing strength and the infirmities of age, Mr. Spencer has done little more than to superintend the work of his sons, and finally, after a severe illness of less than four days, on the evening of September 28, 1881, he breathed his last. The funeral services were held at Canastota on the afternoon of the 30th.

The Rev. J. W. Whitfield preached the discourse from the text: "Jesus himself testified that a prophet hath no honor in his own country." We make the following extracts: "We have always felt that our country did itself a great wrong in not making more of the gifted man, whose remains are before us to-day; with proper encouragement by an endowment which would have placed him above want, and the necessity of laboring for his daily bread, his genius might have brought great gain and honor to the land and good to the world; with the millions of wealth there is in our nation, government or individuals should have enabled Mr. Spencer to have given his whole time to experiments and investigations in his line, where he was well able to do the very things the scientific world needs every hour."

We quote from Judge Barlow, on the same occasion: "He virtually revolutionized science, put it upon a basis never before known, carrying the investigating mind into a field of thought, limitless, boundless, bottomless, rich, profound and glorious. Yes, a field that fills the very soul of a thinking mind as with the quickening powers of inspiration. Geology, minerology, astronomy, theology, all—all the sciences have felt the touch of his powers as a quickened spirit, to raise them up and bring them forth to greater light and beauty. He opened the eye-lids of the dark and unknown, and said to the world—look, behold the works and the wonders of the mysterious Being you worship, and awaken to the gratitude and love you owe Him. All, and more than this, have sprung from the toils of yonder studio and laboratory of the little chamber of his early home.

I may be deemed extravagant, but I venture to say Charles A. Spencer's name is immortal. A Galileo, a Copernicus, a Harvey, a Columbus, and others by their discoveries in their fields of study and labor have rendered their names immortal, and Spencer's will now class with the undying."

The photograph from which our engraving was made was taken during the last year of Mr. Spencer's life, and only a short time before he commenced to show signs of failing in general health.

To honor this talented man has been our privilege and delight; and the more to show our recognition and appreciation of his valuable labors do we give this slight contribution to his memory.

SOME HINTS ON THE PREPARATION AND MOUNTING OF MICROSCOPIC OBJECTS.

BY W. H. WALMSLEY.

SO MUCH has been written and published on this well worn subject, that it would seem almost superfluous, if not presumptuous, in me to attempt to add thereto. But recollections of the many failures, in my early attempts in years long since gone by, of the wastage of time and materials incurred, and the unsatisfactory knowledge gleaned from books, impel me to jot down for the benefit of others, the results of actual experience in this work.

Dissecting Needle.

Whilst by no means asserting that the processes to be described are *the best*, I would say that I have found them to be uniformly satisfactory, yielding always the desired results, and that all have stood the tests of actual use and experience. I shall give nothing that I do not use in my daily work; and shall not state what "my friend Smith" *says* "is his process," or that "I am told Mr. Jones does this and that." Smith's and Jones' processes *may* be vastly superior to those I shall give, but not having tested, I shall not speak of them, my intention being to give simply and succinctly as possible, my methods of preparing and mounting ordinary objects of interest; which may prove of use to many a beginner in this fascinating pursuit.

Nearly all microscopic preparations are mounted in one of three ways: in balsam or other resinous media; in air in the dry way, and in aqueous or other fluids. Of these methods I shall proceed to speak first of balsam mounts, the *essential* materials for which work are as follows:

A bottle or tube of pure filtered Canada balsam; a bottle each of 95° alcohol, pure benzole, oil of cloves, and liquor potassæ (the latter with glass stopper); a pair of fine *curved* forceps, which should be nickel-plated; another of fine dissecting scissors, and a small dissecting knife; two needles in handles; a few small red sable brushes; one large camel's hair brush; a glass pomatum jar; nest of porcelain dishes, and a few watch glasses; a wide-mouth 8 oz. vial, with

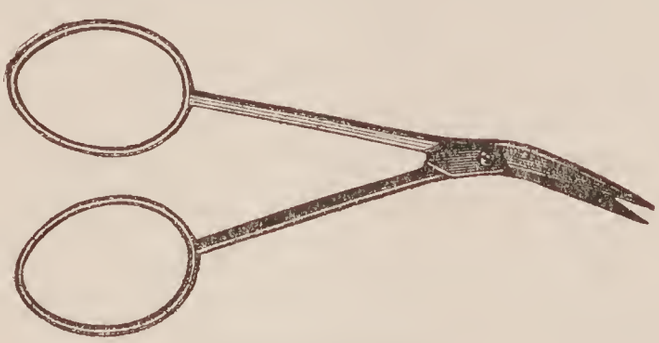
glass stopper; small glass rod; some pieces of very fine brass wire; glass slips and covers, with suitable labels; and a small bell-glass.

Curved Forceps.

To these may be added the following *non-essential*, but very convenient articles: A capped bottle, with glass rod, for containing the balsam (see illustration); a small brass table with spirit lamp; a turn table; porcelain mounting plate (hereafter to be described); magnifying glass on stand, with elongating arm; white zinc cement, shellac ditto, and colored fluid for ornamental ringing; a bottle of absolute alcohol; and a writing diamond. The *luxuries* may be mentioned under the head of a well made self-centering turn table; a hot water drying oven; fine spring scissors; an assortment of dissecting needles, hooks, scissors and knives; and a pair of binocular magnifiers, mounted upon a firm stand, with focussing adjustment. But all the processes of mounting to be here named may be performed with the tools and materials mentioned under the head of *essentials*.

Small Dissecting Knife.

Having thus started in business with our capital of tools and materials, let us proceed to put them to the test of actual use. And I can provide no better subject for a beginning than a common blow fly, or an ordinary house fly, either of which



Dissecting Scissors.

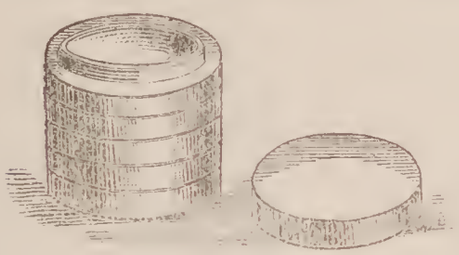
will afford material for several different processes of balsam mounting. A female should be selected, as the ovipositor, which usually contains some eggs, affords a most interesting and beautiful object.

Vivisection not being favored by the writer—first kill your fly in the most humane manner possible (chloroform is recommended);

—then proceed to clip the wings off close to the body, which, not needing any preparation, may at once be placed in alcohol, in one of the covered porcelain saucers. The legs, being cut off, should be placed in liquor potassæ, which should be contained in the glass pomatum jar with a cover. By gently pressing the abdomen, the ovipositor will protude to its full length, and should then be cut off close to the body, and also placed in the liquor potassæ. The tongue should be pressed out in like manner, and when found (under the magnifying glass) to protude to the full extent, with all its parts, should in like manner be cut off and follow the legs and ovipositor. Then the abdomen may be cut open with the scissors, the viscera washed out with the small sable brushes and water, and the skin or epidermis containing the spiracles be placed in the liquor potassæ. The trachea and eyes, requiring different treatment to that we are now pursuing, will not be followed further at present.

The length of time necessary for the various parts to remain in the liquor potassæ, varies materially. Thus an hour, or at the most, two, will suffice for the tongue and ovipositor, whereas the legs and epidermis will require an immersion of not less than one or two days. Great care should be taken to remove them before too much color is abstracted, as the beauty of a preparation is quite lost if it be pale and colorless. A good rule is to remove these parts from the liquor as soon as they assume a lightish brown appearance; placing them in water, and carefully washing and brushing them with the sable brushes. One of the nest saucers will be found a most convenient vessel for doing this in. They should then be transferred to a glass slip, taking care (with the tongue) so to spread it out with the needles as to show the lobes and false trachea, and (with the feet), to show the hairy pads. When properly spread out, place another glass slip over them so that they are pressed flat between the two, and wrap tightly with a piece of fine brass wire, which for this purpose should be cut in lengths of 10 or 12 inches. The wire is recommended, rather than thread of any kind, because there are no fibres to become entangled with the specimen, and thus mar its beauty; and it may be used many times over. The slips thus wrapped should then be dropped into a vessel of water, and left for some hours. On being taken from the water and the wire removed, the slips should again be placed in a saucer or small plate of water, and carefully separated to avoid marring or injuring

the specimens. These should then be gently, but thoroughly washed and brushed, to remove every remnant of the liquor potassæ or dirt that may have adhered to them, and dropped for a few moments into alcohol; one of the nest saucers again forming a convenient vessel for this purpose. The slips of glass having meanwhile been wiped clean and dry, the objects are again to be transferred to one of them, covered with the other, wrapped with the wire and dropped into alcohol, which for this purpose should be contained in the wide mouthed bottle with glass stopper. And here they may safely rest until we are nearly ready for the final operation of mounting; be it the next day, or year, matters not, as the alcohol will not alter or bleach them.



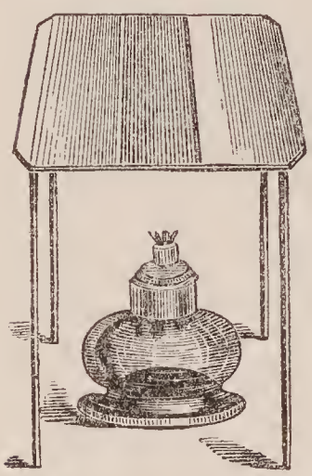
Porcelain Saucers.

The final work to be done upon our specimens, preparatory to mounting, is transferring from the alcohol to oil of cloves, which is a substantial repetition of the previous transfer from water to alcohol. The slips of glass taken from the bottle, and the wire removed, are to be placed in a saucer containing alcohol, and gently separated, to avoid injury to the specimens, which are now to receive their final brushing. If we have provided ourselves with absolute alcohol, a short immersion in the same, in a watch glass is advantageous, but not absolutely necessary. And now having poured a small quantity of pure oil of cloves into one of the porcelain nest saucers, we carefully transfer the tongue, feet, etc., to the same, not forgetting the wings (which all this time have lain quietly in the alcohol, as originally placed, not having needed any of these complicated manipulations), immediately replacing the cover to exclude dust.

It will be observed that I rigorously exclude turpentine in all forms, from my work. I have ever found it a most unsatisfactory medium, foul smelling, sticky, and rendering all tissues immersed in it stiff and brittle. Oil of cloves, on the contrary, is in all respects a most admirable medium, rendering all tissues and substances fully as clear as turpentine; is agreeable to the sense of smell, does not stiffen anything immersed in it, and is perfectly miscible with balsam or damar.

After this digression, and whilst our specimens are clearing up in the oil, let us see to our glass slips and covers, and to the balsam

in which the former are to be mounted. Very many processes for cleaning the slips and covers have been given to the world by various writers, and probably they are all good. I give only my own, which I have used for many years, with entire satisfaction, and therefore can confidently recommend it. The slips (which should be smooth edged), are placed in a basin with *hot* water and good soap, and wiped dry with a soft towel, after being thoroughly washed and rinsed. They are then placed in a drawer, and are ready for use at any future time, merely requiring to be brushed off with the large camel's hair pencil when used. The thin covers (which should *always* be circles, and not squares, as making neater and more readily finished mounts), are dropped one by one in a glass tumbler, containing sulphuric acid, and allowed to remain there for some hours. The acid is then poured off, and water *carefully* added, which in its turn is decanted and replaced with fresh water, the whole contents of the glass being freely agitated until every trace of the acid is removed. One of the glass pomatum jars is now to be partially filled with alcohol, and the thin covers placed therein to remain until wanted for use, when they can be removed with the forceps, and a slight wiping with an old, soft linen handkerchief will leave them brilliantly clean.



Mounting table with lamp.

My own preference is for absolutely pure filtered balsam as affording the most satisfactory results in all sorts of mounts, but that from which the spirits of turpentine has been expelled by heat, and replaced by chloroform or pure benzole, answers a most excellent purpose, whilst the many damar mediums are also good. But following the plan upon which this article was begun, of giving only those processes, which I habitually practice, and know to be satisfactory, I shall confine myself to pure balsam alone. The great secret in its successful use is to have it of just the proper consistency, neither hard enough to resist the thrusting of a fly's wing into a drop of it when placed upon the slide, or so limpid as to spread and run when so placed. If too thick, a little chloroform carefully stirred into the bottle containing the balsam, will reduce it to proper consistency; if too thin, a covering of cotton cloth should

be placed over the mouth to exclude dust, and the bottle put in a warm place for a day or two. My own plan is to put it—when found just right—into collapsible tubes, from which the proper amount can be squeezed out upon the slide, and in which it will remain of the same consistency until the last drop is used; but most persons will prefer to dip it from a wide mouthed bottle with a small glass rod, and to such I would strongly recommend the capped bottle, which I have named under the head of *non-essentials*, as it excludes all dust, allows the rod to remain in the balsam when not in use, and prevents any foreign particles from falling into the latter, as must be the case in all bottles closed with a cork.

Capped Bottle for Balsam.

And now we have brought our work down almost to the final operation. Our specimens are soaking in oil of cloves waiting to be mounted, our glass is clean and bright, our balsam in its bottle, our forceps and needles lying in their places ready for instant use. What more do we need? Only a lamp or other convenient method close at hand for warming the slide and cover; and some mode of *centering* the object before applying the cover. The latter *may* be done by laying a slide on a sheet of white paper or card board, and drawing its outline with a pencil, and on removing the slide making a mark exactly in the centre of this drawing. Of course, when the slide is replaced, this mark will apparently be in *its* centre, and thus the balsam and object can be accurately placed in proper position. The principal objection to this method, is that the slide is apt to slip out of place, and thus to render accurate centering almost impossible. A most admirable contrivance for this purpose, however, is the "porcelain mounting plate," named under the head of *non-essentials*. This is made of a photographic porcelain plate, 3 x 5 inches, ground flat upon one side, on which are cemented at right angles to each other, two small strips of glass, the one three inches in length, and the other one inch. A mark is then made upon the plate with a pencil, exactly 1½ inches from one strip, and ½ an inch from the

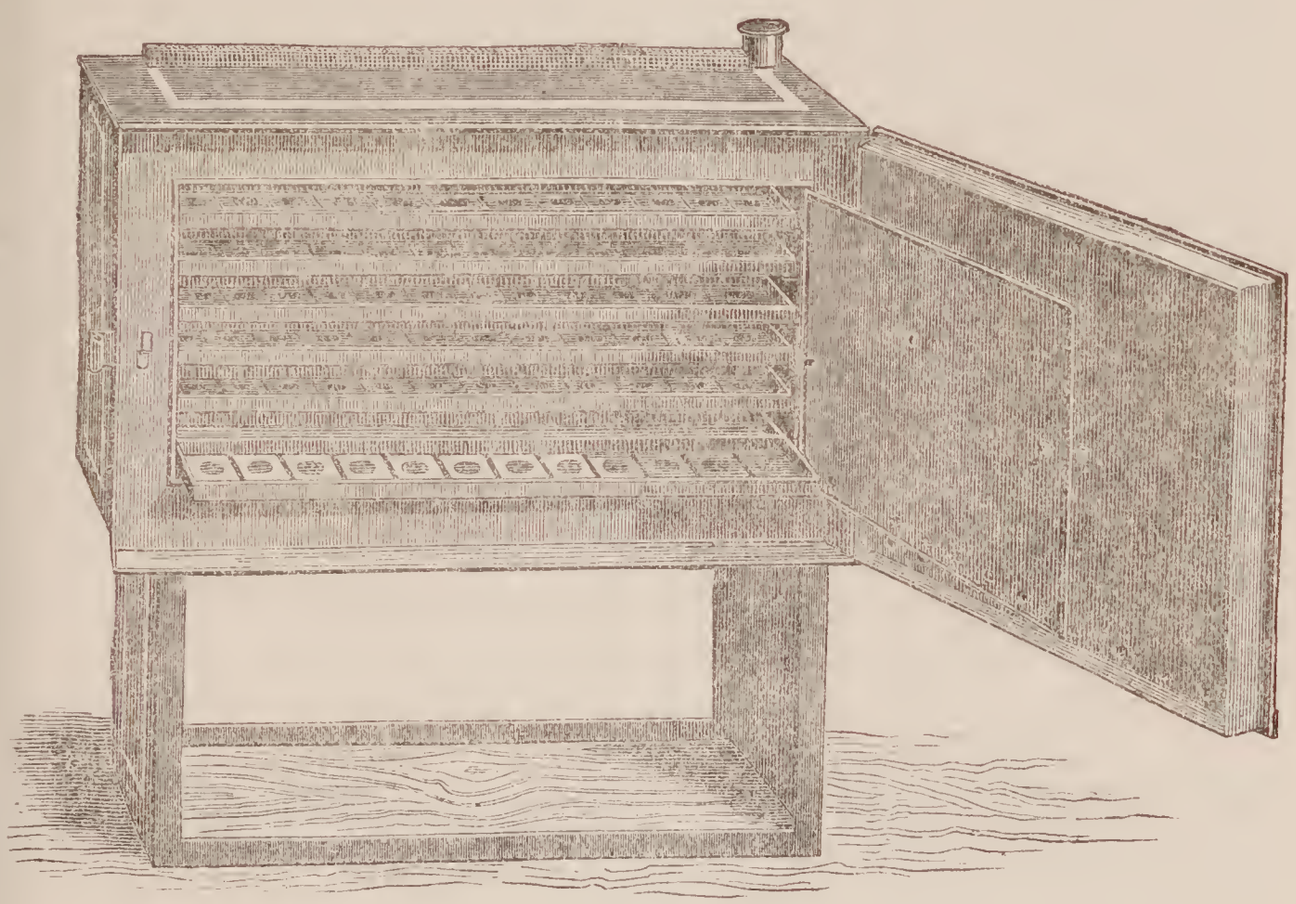
other, so that when the ordinary glass slip is placed upon the plate, with one end in contact with the two strips, this mark is seen exactly in the centre. The slip is held firmly in place, and the white surface of the plate serves admirably as a background upon which to arrange the object.

Collapsible tube containing mounting material.

At last we seem to be really done with all our preliminary work, and ready for mounting. But wait another moment. Though as before stated, the oil of cloves is perfectly miscible with the balsam, and a specimen may be transferred directly from the one to the other, it is a very slow drier, and an object so mounted might be months in hardening sufficiently to handle, even if the utmost precaution be taken to drain off all the superfluous oil. Fortunately we have an excellent remedy for this trouble close at hand. Pouring a small quantity of benzole into a watch glass, we place in it one of the specimens, say a wing, and immediately cover it with the small bell glass to exclude dust, and prevent the evaporation of the benzole, which is exceedingly volatile. And now at last we are ready for the mounting.

One of the cleaned slips having been placed upon the mounting plate, and its surface dusted off with the brush, a drop of balsam of exactly the proper dimensions, is to be placed in its centre, indicated by the mark upon the plate. And here, practice alone must be our guide, for the amount must be varied according to the diameter of the covering glass and the thickness of the object. In mounting our present specimens, say with covers of 5/8 inch diameter, it will be found that more of the balsam will be required to fill up evenly to the edge of the cover, with one of the legs than with a wing. The great aim should be to get exactly the right amount dropped on the slide at first, so that it will fill to the edge of the cover when the latter is pressed down, without any excess exuding, or any additional filling being required. No rule can be given for doing this; only continuous practice can give one the necessary skill; but it is worth trying for, since a mount thus made possesses an artistic appearance, which cannot be equalled by any other means.—But to return to our muttons.—The drop of balsam having been placed in the centre of the slide, the wing is taken from

the benzole with the forceps, and thrust into it—the balsam—gently, but firmly; and then with one of the needles it is to be pushed down upon the slide, (into firm contact with its surface, in fact), and arranged in proper position. Now mark this point carefully. If the object be left suspended in the drop of balsam, as soon as the covering glass is applied, it will float out of position, and much valuable time, and more patience be consumed in getting it back, together with the added risk of destroying it in the attempt. But if it be placed in close contact with the surface of the slide, it will become firmly fixed. The forceps having been wiped clean (it is still better to have a second and heavier pair for this purpose), one of the cleansed covers is taken up by them, slightly warmed over the lamp,



Drying Oven.

and gently laid upon the balsam, which will spread out under its warmth, if the operation be successfully performed, as the cover settles down to its level. This can be aided by carefully warming the slide over the lamp, holding it in a perfectly level position, and the warming should be continued until the fluid balsam has reached the edge of the cover all around, when the slide should be set aside

in a moderately warm place for say 24 hours. On no account should the cover be touched or pressed down at this time, and no notice should be taken of any bubbles that may appear, as they will move out to the edges and depart of their own accord. On the following day the slide may be again very gently warmed, and the cover very slightly pressed down with the forceps, after which, if we possess the luxury of a drying oven (see illustration), we will place it therein, and by the aid of a small kerosene lamp, maintain a temperature of about 120° Fahrenheit for a week or ten days, when the preparation may be taken out to remain, we trust, "a thing of beauty and a joy forever."

The same process that we have followed to its end with the wing, suffices for all the other portions of our fly, and indeed, for all specimens not thick enough to require a cell; for these special directions will be given in a future article.

If our work has been entirely successful, the slide is now finished, with the exception of labeling. But if (as is more likely), there was an excess of balsam, which has exuded from beneath the cover, it must be cleaned off with a knife, and being by this time hard and resinous, this is very readily done, after which a little soap and water will remove all traces of it. Most persons will prefer to finish their slides with a ring of cement, and for this purpose a turn-table, which I have enumerated among the *non-essentials* for balsam mounts, must be provided. The slide having been accurately centered, a ring of the shellac cement is to be applied, followed by successive ones of white zinc, until the space between the surfaces of the slide and covering glass is quite filled up, care being taken to allow each coat to harden before applying a fresh one, which is rapidly accomplished with this invaluable cement. A narrow ring of some bright color makes a pleasing finish, and can be readily made by adding to the ordinary damar medium a sufficient quantity of any desired color, ground in a little oil. All these cements should be applied by small *red sable* brushes, and the best mode of using them is to have the bottles in which they are contained filled with long, tapering corks, into the under side of which the brushes are to be fastened. They are thus always immersed in the cement when not in use, and never can become stiff and dry; whilst they undergo no apparent deterioration. I am now using in my white zinc bottle the same brush that I placed there six years ago,

during which time it has been employed to ring many thousands of slides, and is now as "good as new." The long cork forms a very convenient handle for the brush, and if care be taken to wipe it and the neck of the bottle with alcohol, occasionally, they will never stick together.

It is to be noted that the flattening between glass slips, etc., is only necessary in the case of objects of considerable thickness, such as the fly's leg we have been preparing. All *thin* objects, as sections of animal or vegetable tissues, etc., may be carried through the alcohol and subsequent stages, in the same manner as that pursued with the fly's wing; or, if perfectly *dry*, may be at once immersed in the oil of cloves, or even mounted in the balsam, without previous soaking in anything.

And now, having brought our balsam mounts to a successful completion, I must also make an ending of the present paper. In future ones (if this be well received), I propose to give some practical hints on mounting in the dry way, both opaque and transparent objects suited to that method of preparation; also on fluid mounts of various sorts, and possibly others on the double staining of vegetable tissues.

Should any of my readers desire to see a balsam mount prepared according to the foregoing directions, I shall be pleased to exchange with him or her for any well prepared original slide.

THE DEVELOPMENT OF STARCH GRAINS.*

BY GEO. P. ANDREWS, M. D.

IN connection with the growth of vegetation are found various contrivances for the elaboration of the nutriment required by the plant. A portion have to do primarily with the immediate increase in the size of the plant and the perfecting of the reproductive apparatus, and are means by which the inorganic and lower organic materials are carried up to higher combinations, immediately available for development. Other materials are produced when the pabulum supplied to the growing plant is in excess of its present needs, and are stored up during the period of [illegible]

*Read before the Griffith Club of Microscopy.

activity, and become a reserve, either in the seed for the needs of the young plantlet, or in leaves, bark or substance for a time of scarcity.

Among the products laid up in store, starch is undoubtedly the most abundant and important; it is found in all the higher classes of plants and in many, perhaps most of the lower. It supplies to animals a very large proportion of the food derived from the vegetable kingdom, and probably to the fact that mankind has been able to enormously develop the starch producing power of the cereals is largely due his own elevation from savagery to civilization. Deprive the race of the starch reservoirs found in wheat, maize, rice, and their congeners, and how long could the enlighted races maintain their supremacy? The last two or three years have well nigh proved that wheat is king of Europe. A few facts in regard to the development of the starch-grain then, will interest you for a few minutes.

To Nägeli and Sachs we owe most of what is known of this subject. From a recent paper in the Quarterly Journal of Microscopical Science by Mr. A. F. W. Schimper, and from Sachs' Text Book of Botany I have mainly derived the material offered you.

Starch, as such is not directly available for nutriment; it is a substance comparatively stable, though under conditions of heat and moisture and in the presence of a proper ferment it becomes transformed into soluble sugar, and then is appropriated by the elaborating organs of the plant; familiar instances will occur to you at once in the various grains. When the seed is planted, the moisture and heat of the proper season enable the ferment existing in the seed to convert the starch into sugar, which goes directly to the growing germ, supplying it with food before it yet has roots adequate to draw nutriment from the earth. Tuberous roots, as the potato and arrowroot, present a similar provision except that here a young sprout is the subject to be supplied. In the potato bin, in the spring it is common to find the old potato shriveled and deprived of its starch to supply a tall etiolated sprout, with scarcely any root to support it.

Starch presents the same general characteristics wherever found though it varies much in the size and shape of its grains, and while the subject has as yet been comparatively little studied, observers recognize at least two methods in its production: First, as seen in

the stems and leaves of plants exposed to light, contained within the so-called "chlorophyll-corpuscles." Sachs describes the grains as appearing inclosed within the chlorophyll grains themselves. The starch-grains are found alone or aggregated at various points in the chlorophyll-corpuscles; they appear first as bright points which increase in size, and becoming more or less spherical at first, may finally be oblate, pyriform, irregular, or angular from crowding. The maternal corpuscles at first increase in size, but subsequently shrink and may finally disappear. The starch grains appear to be formed in some plants irregularly throughout the substance of the corpuscle, but in others they always develop just beneath the free surface, seeming presently to rupture the membrane of the corpuscle and project beyond. The shape of the corpuscle probably has a determining influence upon the location of the grain or grains. Where it is spherical they appear irregularly over the periphery, but when, as is more common, it is discoid they project around the edge; six or more may thus girdle the corpuscle, and rarely, minute ones are seen upon the flat surfaces.

When the starch-grains originate within the corpuscle and remain enclosed, they rarely show signs of differentiation. "When mature they are spherical, completely colorless compound grains consisting of hundreds of small similar polyhedral grains," the irregular shape arising from crowding within the chlorophyll-corpuscle: the latter gradually disappears leaving the multiple starch-grain apparently a simple sphere, but which when dry breaks up into its elements. Examples of this form of development are found in the four o'clock (*mirabilis jalapa*), some species of cactus, (*C. speciocissmus*) or some orchids (*vanilla planifolia*). Starch-grains originating in the second way *i. e.* upon the periphery, are usually much larger and present more perfect development of hilum and layer, the latter eccentric, the part most developed being that attached to the corpuscle. If the grain is in contact with two or more corpuscles growth is more marked at each point of contact, proving that the corpuscle is the source of nutriment. Examples of this form are found in the stems of the common potato, certain species of Begonia, Dieffenbachia, Oxalis, Coctus, etc.

Parts of plants free from chlorophyll "show that the starch-grains which are in process of development are not surrounded by ordinary protoplasm, but that they are contained in, or attached to,

peculiar refrangible corpuscles which are usually spherical or spindle shaped. These bodies are very unstable. So soon as the surrounding fluid penetrates into the cell they swell up considerably and then dissolve. Close observation has shown that prolonged treatment with alcohol causes these corpuscles to become smaller and more resistent. This effect is immediately produced when they are treated with a watery iodine solution, and this is the best means for examining them; they then appear darker or lighter yellow according to the strength of the solution. Millon's reagent colors them when coagulated, a brick red, and nitric acid yellow. These reactions indicate that the bodies in question consist of albuminous substances."

These corpuscles are present in the non-assimilating cells before starch-grains appear at all, and when they do appear they bear the same relation to the starch-corpuscles as in the assimilating cells they do to the chlorophyll-corpuscles. They may be formed at the periphery, or in any portion of the cells, and their development follows the same rules as already described in the chlorophyll-corpuscle. As the starch-grains reach maturity the corpuscle contracts and disappears completely. The office of these corpuscles is, apparently, the transformation of the superabundant nutriment elaborated by the assimilating, chlorophyll furnished cells, into the more permanent form of starch. In growing or recently developed parts of plants the various appearances characteristic of the several stages of growth may be observed. The grains first appear as bright points within the corpuscles, with growth they become spherical, and in many cases show a marked concentric structure which at maturity may determine various shapes to the grains.

Comparing the descriptions which have been given, of the two kinds of corpuscles which produce starch we are struck with their similarity, especially as the chlorophyll-corpuscles are often found producing starch and chlorophyll-grains in the same cell, or starch even within the chlorophyll-grains (Sachs), but their close relationship is more strongly shown by the fact that if the starch-forming-corpuscles are brought into the light, the starch-grains are absorbed and chlorophyll-grains take their place and a true chlorophyll-corpuscle is formed. This is admirably seen in an orchid, *Phajus grandifolia.* The young pseudo-bulb is produced underground, and closely sheathed with several layers of leaf stems, and even for

a time after it appears above ground it is pure white. In this stage of development nothing but starch-forming-corpuscles are found. The continued growth of the young bulb presently causes it to burst its enswathing leaf petioles which gradually wither and drop off, the bulb changing to a bright green, and the starch-grains disappear from the cortical portion of the bulb and chlorophyll-grains take their place. A similar phenomenon is seen in the leaves of *Iris florentina*, which are white when first put forth and contain starch-forming-corpuscles, but as they unfold, rapidly become green by the replacement of the starch-grains by chlorophyll. The same change occurs when a potato tuber is accidentally exposed to light, the portion above ground becoming green by the development of chlorophyll at the expense of starch. In the closing paragraph of his paper, Mr. Shimper mentions an interesting point which has been brought to light in the course of the original investigation. "There is no such great difference between assimilating (chlorophyll-corpuscles), and non-assimilating cells (starch-forming-corpuscles), as was thought to exist. In a cell which contains no chlorophyll there are certain organs which produce starch, and these organs are nothing more than imperfectly developed chlorophyll-corpuscles, which may develop into perfect chlorophyll-corpuscles, under the influence of light. On the other hand, chlorophyll-corpuscles are not always merely assimilatory organs, they perform in the conducting tissues and in the reservoirs of material the same functions as the starch-forming-corpuscles in cells which do not assimilate; that is, they produce starch from assimilated substances which are conveyed to them from other parts of the plant."

These investigations of course give little clue as to how the chemical elements of starch are combined in the plant cells, but they show that there are undoubtedly various intermediate substances formed between the crude elements that are taken up by the roots, and leaves. In investigating this subject comparatively high powers are required, 800 to 1000 diameters are desirable, although, a first class $\frac{1}{6}$ in. objective with a 1 inch eye-piece will do very well for many specimens. Recently formed portions of tissue should be chosen for examination, and if not available for immediate use the specimens may be preserved in proof alcohol.

DETROIT, Oct. 1881.

Editorial Department.

THE November number of the *American Monthly Microscopical Journal* is before us, and on page 216 we are honored with another heavy editorial.

In our opinion, Mr. Hitchcock made a mistake in condemning us in his July issue, when he had seen but one number of our journal.

Had his opinion, as then expressed, been given after he had seen several of our numbers, we would have said nothing, for everyone has a right to thus express himself; but just as soon as he sees us he tries to decapitate us, and that too when he knew that it was our first attempt at journalism, and that we were going to try and put our journal before a class needing a journal, but having none.

Mr. Hitchcock knows that we never intended to publish a theoretical and purely scientific microscopical journal, for we have repeatedly announced our purpose of giving to physicians and pharmacists simple, practical hints in microscopical work. Such a journal as Mr. Hitchcock's does not fill, neither does it enter our field, and neither has it entered our minds to become a competitor with his journal. Knowing this, we unhesitatingly declare his conduct anything but "journalistic courtesy." It is—what he declares it is not —"discourteous and unfriendly."

As Mr. Hitchcock furnishes his readers with some "correspondence," so will we do the same. He has made the initiative; we are obliged to take the defensive.

These letters were in our possession at the time of the writing of our October editorial, and they were given at first in that article, and afterwards stricken out.

"Have you seen Hitchcock's editorial on Dignity? Pretty fellow he, to talk of dignity, when he is the biggest scold outside of Billingsgate."

"Mr. H. may be what they call a 'scientist,' but on page 138 he shows he has a spirit not necessary for it."

"Mr. Hitchcock's editorial was not called for, and shows too plainly the spirit that prompted it."

After the October issue was mailed, we received a number of letters after the following:

"As a microscopist of 20 years, let me say that your editorial in reply to Mr. Hitchcock is none too severe. Your journal is appreciated by practical microscopists."

"While I respect Mr. Hitchcock's ability, I regret the course he has taken."

Two of the above letters were from experienced editors of very prominent scientific journals.

Within the past ten days, a man "who is acquainted with nearly every medical and pharmaceutical journal in the country," says: "If the success of THE MICROSCOPE in a financial sense at all matches its literary style, I must congratulate you upon a 'strike' in the field of periodical journalism."

An advertiser in Mr. Hitchcock's journal, under date of November 3d, says: "Your journal is a bright, earnest sheet, and in the direction of practice rather than theory. There is plenty of room for your journal."

Mr. Hitchcock ridicules us for calling attention to Dr. Hahn's discovery. He calls it "sensational and highly improbable; not deemed sufficiently authentic to deserve mention in these columns." We reply by asking "What does the *Royal Microscopical Journal* of London say about it?" "What does *Science* say about it?"

Mr. Hitchcock is older than we are; has had experience in journalism; has written and said much on the theory of the microscope; yet, notwithstanding this, we have added nearly 100 paid subscribers to our list since our October issue, and before this journal reaches the reader the number will be largely increased. It is the "familiar, colloquial style" that does it. The busy physicians and pharmacists desire practical help, not theoretical. It is for this reason that the first edition of our Histology was exhausted in less than six months after its appearance, a revised second edition being in press now.

In conclusion, Mr. Hitchcock, we cordially invite you to give us a visit. Our 400 students who study microscopy each year under our supervision, will welcome you. We will show you over 100 compound microscopes. You may use our immersions; we have a $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{12}$, $\frac{1}{16}$, $\frac{1}{18}$, and $\frac{1}{50}$. We will show you specimens mounted by our students, forming a part of their yearly total of 7,000. We will show you as fine drawings of microscopical specimens, for students' work, as you have ever seen; and we will study over our test diatoms and ruled plates as long as you may desire.

WE clip the following from "*The Chronicle*" University of Michigan. "Last May Mrs. Louisa Reed Stowell received a letter from W. H. Walmsley, of Philadelphia, who is the R. and J. Beck of America, stating that the firm in London, had just perfected a very fine new style of microscope, and asking that she suggest a name for the new instrument. Mrs. Stowell thereupon sent the name "Ideal," and forgot all about the matter until the other day when she received a letter from Mr. Walmsley stating that if she called at the express office here she would find something that might please her. She called as suggested, and received a box, which, on being opened, disclosed a handsome mahogony case containing a sample of the new microscope referred to. On the box was a brass plate bearing her name, and upon the instrument itself the name "Ideal," and under it her own name. The microscope has a very fine lacquer finish, and all its adjustments are perfect. Three objectives, $\frac{1}{8}$ in., $\frac{2}{3}$ in., and $\frac{1}{6}$ in., two eye-pieces, A and D; a pair of stage-forceps, and a fine condensing lens came with the microscope. It is surely a handsome acknowledgement on the part of R. & J. Beck and Mr. Walmsley and is worthily bestowed."

WE have spared no expense in order to give our readers a fine engraving of the late Chas. Spencer. We sent the photograph to one of the best houses in the United States and asked them to do their best. Our publishers have taken extra care and trouble in the printing and we know our friends will be pleased with the results. We declare again that as you prosper us by your subscriptions and contributions so will we give you a better and more elegant journal. We are not backward in declaring that Mr. Walmsley's practical article, alone, is worth the subscription price for a year to each reader, and we are promised other articles from the same source "provided this is well received."

WE are crowded with matter for this issue. A very fine illustrated article for pharmacists is in type now, but must wait for our next issue. Messrs. Allaire, Woodward & Co., of Peoria, Ill., have very generously consented to give us a number of their prize essays for publication. They will appear at an early date. Another fine lithograph of "Urinary deposits" in the February number.

MR. Hitchcock asks for those who have received eleven of the twelve numbers of Vol. II. of his journal to pay their subscriptions. If his subscribers felt as if they had received anything, doubtless they would have paid long ago. Perhaps those persons intend to pay him in the same way the Bohemian paid his tailor. The tailor's bill had remained unpaid for years. One day he called upon the Bohemian and found him in bed at noon. "Why don't you work instead of sleeping?" said the tailor. "Time is money." "Ah, well, if time is money," answered the delinquent, "I will pay *in time*."

WE have had placed in our hands, for sale, one of McAllister's best oxy-calcium lanterns, No. 402, with a large number of views. The whole outfit cost over five-hundred dollars; has been used but three times and must be sold.

It will be sold for two-hundred and fifty dollars cash. It is complete in every respect. Full details given to any one who thinks of purchasing and can raise the cash. It is as good as new.

THE offer we made in our last issue, viz., to buy microscopes for our subscribers, holds good yet under the same conditions.

READ carefully the new advertisements of Bullock; Zentmayer; Chapman, Green & Co.; Fasoldt; The Century Co., and Munn & Co.

Selections.

MICROSCOPY.—Dr. Bermann, in the *Archives of Medicine* gives "Some Points on Staining in Toto and Dry Section Cutting," which are of so much practical use, that I shall give them for the benefit of those, who may be interested in the subject, or as the doctor says: "For the benefit of those medical men, who wish to consider the study of pathological microscopy, as it enables them to work whenever they find leisure and to leave off at any stage of the proceedings, without fear of spoiling what is unfinished." For hardening the tissues, with scarcely an exception, Muller's fluid (containing $2\frac{1}{2}$ parts of bichromate of potash, 1 to $1\frac{1}{2}$ parts sulphate of soda and 100 parts distilled water) is to be preferred, because it hardens the tissues without shrinkage, and almost preserves their natural appearance. It may not be amiss here to mention that it can be satisfactorily employed only when the following rules are strictly observed:

1. The greater the quantity of fluid, within certain proportions to the size of the specimen to be hardened, the more confidently one may count upon its success.

2. The fresher the specimen, the more accurate and reliable will be the definition of the cellular construction of the sections—specimens not prepared after this fashion will under no circumstances repay the labor and trouble expended upon them.

Besides slightly staining the tissue, Muller's fluid has the advantage of preserving the blood corpuscles in the vessels better than other hardening agents, but to attain this end the fluid, which is perfectly transparent, should not be allowed to lose its transparency and must be very frequently changed—not less than twice on the first day, and then (according to the quantity of the fluid) at least every other day. A small piece—say half a cubic inch—requires about a week to attain the right consistency, when, after first washing it in water, it is transferred into alcohol of about 75 per cent. It is not absolutely necessary to harden the specimen, in Muller's fluid first; those put only in alcohol in the beginning will stain just as well. I prefer to use Muller's fluid, because most tissues shrink

in alcohol unequally and thus are apt to spoil the right proportion of the specimen.

To insure perfect success in staining it *in toto* (one of the principal advantages of the method) the alcohol must be changed as often as it becomes yellow, for the specimen is not ready for staining, until the alcohol remains perfectly colorless. The specimen is then removed to the staining fluid, which is as follows: Dissolve five grammes of best carmine in about eight grammes of caustic ammonia, then add distilled water until its contents equal 100 cubic centimetres. After equal parts of absolute alcohol and glycerine are added to it, it is put on the hot water bath and kept there, until the prevailing odor of the ammonia has almost disappeared, which is usually accomplished in about two hours. When properly made, no sediment will be deposited. The fluid is now ready for use and has this great advantage over other carmine solutions, that it can be used over and over again and at the same time acts as a preserving fluid, so that the specimen can be left in it for an unlimited time. It never stains too deep a shade and makes the nuclei come out very sharp. For the examination of glands, where it brings out the lunulæ most perfectly and also of nervous matter, it cannot be surpassed. The disagreeable quality of carmine—to stain well one day and diffuse the next—is thereby entirely obviated. Another staining fluid, with which you can obtain beautiful results either in combination with the first for double staining or by itself alone, is that prepared with hæmatoxylin. It is especially to be recommended for pathological specimens, because the hæmatoxylin has a peculiar affinity to the products of inflammation and cells of pathological origin. To prepare this fluid mix Bœhmer's hæmatoxylin with equal volume parts of absolute alcohol and glycerine. Thus mixed it forms the solution for staining *in toto*. It does not stain so quickly as the carmine solution and pieces of the above mentioned size must remain in it from three to four weeks, when they are taken out and again put into alcohol to harden.

Specimens stained in the carmine solution alone are taken out and to remove the superfluous carmine, are washed in distilled water for a few hours, then put into weak alcohol to be changed for stronger, until no more of the pink coloring matter is drawn from the specimens; then to extract all water from the tissue it is trans-

ferred into absolute alcohol, which must be changed several times. When this end has been accomplished, it is put into spirits of turpentine, also to be removed twice at least for large pieces. It is then placed in a saturated solution of paraffin in spirits of turpentine, where it is again left for several days—the time varying with the size of the specimen. Next, it is removed and laid on filtering paper, that the turpentine may evaporate; the paraffin remains and fills the crevices, blood and lymph vessels, &c. When sufficiently dry, it is embedded in a mixture of paraffin and mutton suet—the proportions of which vary with the seasons. In summer, pure paraffin will be found necessary. The paraffin should always be heated on a water bath and it will be found very convenient to throw the piece to be embedded into the hot fluid mixture, so that it gets thoroughly soaked and when cooled off, forms an inseparable mass of equal consistence with the paraffin. You will never find any tissue, not even embryonical, to spoil by exposing it to a moderate heat, while in the fluid paraffin.

It is then ready to be cut dry, and can be preserved in this state any number of years.

For cutting, it is best to employ a sledge microtome, made by Hærtel, in Breslau, after designs by Dr. Long, which enables you to make very long sections of equal thickness—from $\frac{1}{100}$th of a millimetre upwards. When properly constructed, it is the most perfect instrument of its kind known and the cost of it with two knives and a case is in Germany, at the makers, 75 marks, equal to about $19. The section thus cut is transferred to a slide, where it frequently has to be unrolled, the only drawback to the method, as it requires some dexterity of manipulation. To dissolve the paraffin remaining around and in the section a few drops of a solution of creosote and turpentine (in the proportion of one to four) are added, and when this has been removed from the glass by wiping or by drawing it up with filtering paper, it is enclosed in either damar varnish or Canada balsam.

It happens pretty frequently that the specimen, when in the paraffin, is found not to adhere to it. In that case throw the whole piece back into the hot paraffin and suet mixture and embed it then anew. By this manipulation you get rid of

the superfluous turpentine, which was the cause of your former poor success.

By following this method to the letter it will be certain to reward any colaborers in microscopical researches and they will obtain especially fine specimens by staining first in the carmine and then the hæmatoxylin solutions. These double stained specimens enable us to differentiate the individual cells, which take the carmine solution up with equal intensity. As a matter, of course, the specimen stained in carmine has first to be washed out and hardened in alcohol, before it is subjected to the hæmotoxylin solution. For instance, the neuroglia cells of the spine and brain, cancer cells and other pathological products are brought out with greater clearness. Objects thus stained *in toto* can be preserved in alcohol for an unlimited time and can also be embedded for cutting in any other manner according to the fancy of the worker.

Mr. Heneage Gibbes in the *Quarterly Journal of Microscopical Science*, of London, had this to say in regard to the use of the Wenham Binocular with high powers. A great many plans have been tried for the purpose of obtaining stereoscopic effects with high powers and these have all required a special stand, or special apparatus entirely removed out of the reach of the ordinary working microscopist and led, I think, to the prevalent idea that the binocular microscope is entirely unsuited for histological or pathological research. With a $\frac{1}{12}$th oil immersion of Messrs. Powell & Lealand's make, attached to a Wenham binocular the stereoscopic effect is perfect, the whole field is illuminated and the result obtained is really wonderful. Taking a preparation of the tadpole's tail hardened in gold solution the different elements are seen in their true relations to each other; there is no difficulty in deciding whether a fine nerve termination passes over or under or into a connective tissue corpuscle. Cells are seen not as flat plates, but as spheroidal bodies, with their intranuclear and intracellular network pervading their whole substance. The only difficulty I have found is to persuade people that the power is really so high, objects stand out in such bold relief, they cannot believe it possible. This, therefore, is a most important improvement.

Mr. Heneage Gibbes in the *Quarterly Journal of Microscopical*

Science, of London, writes as follows on the "Structure of the Spermatozoon:

I have examined a number of specimens of the human spermatozoa, some taken from the testes twenty-four hours after death by accident, others from twelve to twenty-four hours after coïtion; these came by post and I could detect no material difference in their structure, with the exception of the varying lengths of the tails in different specimens. I think something may be made of this, if one could only get sufficient data to go upon. In all I found a long, very fine filament, which required great care in the illumination to show it properly, as when after a good deal of trouble it was shown well with the $\frac{1}{25}$th immersion, I found I could readily see it with the $\frac{1}{15}$th oil and even the $\frac{1}{12}$th oil immersion. The filament is very fine and is connected to the tail by a membrane, which is much wider than in the amphibia and allows it to move further from the tail; it is also longer than in the amphibia and is more folded in consequence. The mere fact of this discovery is pointed out by the author. I suppose its significance will be determined by future investigation.

Attention should be called to the fact, that Ranvier has established the extremely important and unexpected fact, as far as the muscular coat of the sweat glands is concerned, that muscular tissue in the mammalia is developed from the epiblast.

Prof. Pouchet, of Paris, writes an article full of close research on the much discussed origin of the "Red Blood Corpuscles." After treating the lymphatic glands, the spleen, the marrow of bones, the lymphoid patches in the mesentery, to which he says observers have tried to relegate this so-called hæmatopoietic function and giving most excellent reasons for his non-belief in these theories, he remarks there are yet left the supra-renal capsules and thymus, and asks the question, Do they deserve also to be studied from the same point of view? From this most interesting article, we draw the following conclusions: It must be admitted that the origin of the red blood corpuscles among adult mammals has not yet been completely made out. Anatomists are divided between two principle theories, some with Neumann and Bizzozero distinctly attribute to the red marrow this function in the economy—the production of the hæmatids or red corpuscles and the provision for the normal regeneration of the elements of the blood after accidental

losses. Prof. Pouchet thinks on the contrary with Hayem that the hæmatids or red blood corpuscles originate from the globulets of Donne—only they differ as to the origin of these globulets. Whilst Hayem looks upon them as the endogenous product of cells which are as yet unknown, it seems to Prof. Pouchet that everything goes to prove that they are formed in the blood plasma whilst in circulation in a way which is more or less analogous to the formation of the filament of fibrin in blood which has been drawn from the vessels.—Report by Dr. Haywood, before North Carolina Medical Society. *N. C. Med. Jour.*

Items.

The doctor's jokes are all very plain. There is a Holmes-pun look about 'em.—*Boston Post.*

The State Librarian has recently purchased a copy of Smith's Diatom Altas, which as a book of reference on *anatomy* stands very high with medical men all over the world.—*Extract from a daily paper.*

It is useless for physicians to argue against short-sleeved dresses. The Constitution of the United States says: "The right to bear arms shall not be interfered with."

This is the way they do it over the water: A milk dealer of Frankfort, Germany, who only put one quart of water to eight gallons of milk, was fined $20 and sent to jail for three months.—*Anylist.*

A physician was called to visit a lady in the country. After continuing his visits for some weeks, she expressed her fears that it would be inconvenient for him to come so far on her account. "Oh, madam," replied the doctor, innocently, "I have another patient in the neighborhood, and thus I can kill two birds with one stone."

A scientist in the *Magazine of Pharmacy* asserts that the usual physico-chemical methods for determining the potable nature of water, have proved themselves to be quite insufficient, and he says that "recourse must be had to the microscope and to the culture-glasses used by physiologists in their inoculation experiments, before any really sound and valuable knowledge can be gained by the examination of waters," as to their purity or impurity.

THE VICIOUS CIGARETTE.—Some of the cigarettes which are smoked to so large an extent are said to be dangerous articles. A physician had one of them analyzed, and the tobacco was found to be strongly impregnated with opium, while the wrapper, which was warranted to be rice paper, was proved to be the most ordinary of white paper, whitened with arsenic, the two poisons combined being presented in sufficient quantities to create in the smoker the habit of using opium without being aware of it, which craving can only be satisfied by an incessant use of cigarettes.

THOSE who suffer what they think to be the disgrace of blonde or gray hair will readily appreciate the importance of a discovery just made. In a paper before the Smithsonian Institute, Dr. D. W. Prentiss described the case of a Washington lady who had been treated several months for blood poisoning, with jaborandi, a Brazilian plant used in medicine. It was given in subcutaneous injections to produce sweating. Within two weeks after the administration of the drug, which was in December, the light blonde hair of the lady began to turn to a dark color. In the middle of January it was a chestnut brown color, and in May it was nearly a pure black. A microscopical examination of the hair shows an increased quantity of pigment matter.

"I have ruled plates up to 1,000,000 to the inch, one of which was purchased by the U. S. Government at Washington. I do not believe that I will ever attempt to rule higher than 1,000,000 lines per inch, as from my practical experience and judgment I have concluded that that is the limit of ruling."—C. Fasoldt in *Journal of Microscopy*.

Society Proceedings.

THE semi-annual meeting of the State Microscopical Society of Illinois was held at the Academy of Sciences, 263 Wabash Ave., on Friday evening October 28th. The President, Dr. Curtis, in the chair.

The minutes of the previous meeting were read and approved, and the usual routine business transacted, after which Dr. Mercer described a camera lucidia by Nachet of Paris, which differs considerably from those usually met in this country. It is a square prism with its ends cut at an angle of about forty-five degrees. It is so mounted that one end is directly over the eye lens of the ocular, and this end is provided with a smaller ninety degree prism, so mounted that the pencil of rays from the ocular passes directly upward to the eye, without suffering any change of direction. The two forty-five degree faces of the prism serve to reflect an image of the pencil to the eye of the observer. Thus reversing the performance of the ordinary camera, which changes the direction of the rays from the object under examination. Dr. Mercer thought the apparatus had some qualities which entitled it to consideration. The ease with which it could be used by an inexperienced person being a strong recommendation. In reply to Mr. Bullock he stated that it could be used with as high as a two-thirds inch ocular, possibly with one of still higher power. The cost of the apparatus was stated to be 14 f.

Dr. Johnson exhibited a high angled one-eighth objective made by Powell & Leland. Its balsam angle was +140° and its makers claimed it would resolve the amphipleura pellucida into beads. It had a good working distance, and although an oil immersion, could be used with glycerine and probably with water. It had a remarkable flat field and compared favorably with a Zeiss one-twelfth in the speakers possession. An immersion condenser came with this objective. It is quite different from the ordinary high angled condenser made by this firm, and consists of two systems of lenses placed close together, the lower of which is very large the upper very small. Its pencil of rays therefore has a high angle of convergence, probably as much as 150° for balsam. It is provided with a diaphragm with central and side apparatus, the latter at an angle of ninety degrees. It has also a pin-hole aperture for centering. A Powell & Leland cob-web micrometer was exhibited by Dr. Johnson.

E. B. STUART,
Secretary pro tem.

Reviews.

OBSERVATIONS WITH THE HÆMACYTOMETER UPON THE GLOBULAR COMPOSITION of Blood and Milk. By Frederick P. Henry, M. D., Philadelphia. Published by F. A. Davis, 923 Chestnut Street, Philadelphia, Pa.

This Cartwright Prize Essay shows an unusual amount of research and labor. The conclusions reached are logical and satisfactory. The facts given are original, and a new field is opened.

THE METHOD OF TEACHING THE ELEMENTS OF THE LATIN LANGUAGE. By John Wentworth Sanborne, Perry, N. Y.

This work is prepared for the assistance of teachers and private students in a systematic and thorough study of the Latin language. The noun, adjective, verb, etc., are all tabulated in a convenient form. Address the author as above.

THE NEW BOTANY. A Lecture on the Best Method of Teaching. By W. J. Beal, Professor of Botany in the Agricultural College, Lansing, Mich.

This describes the new method of teaching by studying objects before books.

MICHIGAN STATE BOARD OF HEALTH REPORTS.

TRANSACTIONS OF THE MICHIGAN STATE MEDICAL SOCIETY.

THE MICROSCOPE

AND ITS RELATION TO

MEDICINE AND PHARMACY.

Vol. 1. Ann Arbor, February, 1882. No. 6.

CONTENTS.

PAGE.

Original Communications.
Hints on Mounting. By W. H. Walmsley..... 161
Laboratory Notes. By C. H. Stowell 172
Editorial Department.
American Society of Microscopists .. 175
Prospectus for Vol. II..... 177
Editorial Briefs 179–180

PAGE

Selections.
Root of Apocynum Cannabinum and Androsæmifolium..... 181
A Study of Blood..... 187
Society Proceedings..... 194
Reviews..... 196
Index for Vol. I..... 198

Original Communications.

SOME HINTS ON THE PREPARATION AND MOUNTING OF MICROSCOPIC OBJECTS.

BY W. H. WALMSLEY.

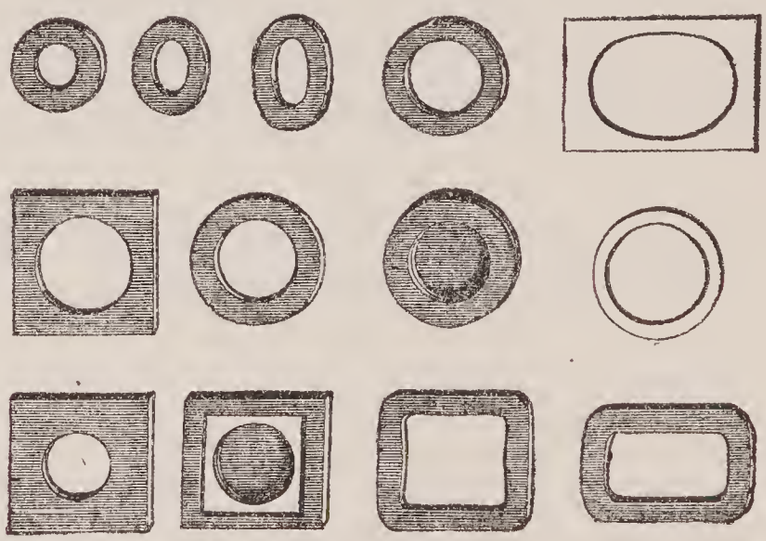
SECOND PAPER.

OUR first paper of practical hints having been mainly devoted to balsam mountings, it was the writer's intention in the next, (if ever written,) to give other methods. But on carefully reviewing the former I find that directions have been given for mounting only very thin or flattened substances, with which but a small amount of balsam is needed between the slide and cover, and the latter lies parallel to the former, with but little inclination to tilt up on one side. There are, however, many objects, so thick as to require some sort of a cell to contain the large amount of balsam, necessary to

cover them, and to prevent the excess from running out beneath the cover upon the slide; whilst other subjects are so delicate that the mere weight of the thinnest covering glass, pressing upon, would crush them out of all shape. We will, therefore, with the reader's permission, give some hints as to various methods of doing this before proceeding with other branches of our subject.

Undoubtedly the most perfect cell, that has yet been devised, is one of glass. For very shallow cells, to be used in mounting diatoms, nothing can equal those cut from thin covering glass, such as are used exclusively by Möller, in mounting his Typen- and Probe-Platten ; and slides of arranged diatoms. These are cemented to the slides by a thin layer of balsam, heated to such a point, as to expel all, or nearly all of the turpentine; and nothing can excel the neatness and perfection of their appearance and finish, whilst they are, of course, quite permanent.

Where deeper cells are required, those cut from glass tubes of various diameters and shapes, or drilled from slips of different thick-



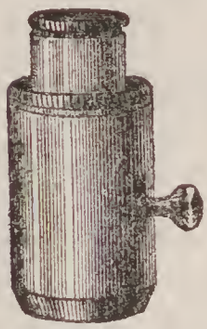
CELLS.

nesses, and cemented to the slides with Marine Glue, are to be highly recommended, as they are extremely neat in appearance, and entirely permanent in character. The objections to all glass cells, are the difficulty of preparing them by ordinary workers, and their extreme costliness, if purchased ready made. If the latter consideration, however, be of no moment to the reader, I would say by all

means use them, and nothing else, as they never give any trouble, and are always neat and handsome in appearance.

Block-tin makes a very good cell, which may be attached to the slide by Marine Glue the same as glass, and which will contain fluid balsam quite as well; but they must either be purchased of the dealers, or made with a special and expensive punch. They are more difficult to finish neatly than those of glass, and are only recommended by reason of their comparative cheapness. Brass curtain rings *may* be substituted for them, and if carefully handled in the mounting, may be found permanent and satisfactory; but my own experience has not been favorable toward the latter, either as to convenience of handling, permanency, or neatness of appearance.

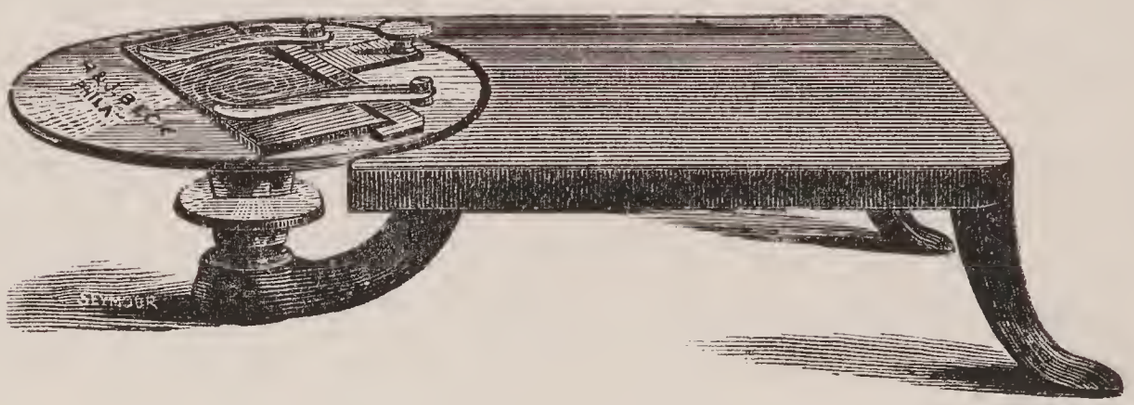
Fortunately we have a material, admirably adapted to making cells, which any one can readily do for himself and at a trifling cost. It is the ordinary white sheet wax used in artificial flowers and which can be procured in three thicknesses, known as "ordinary," "double thick," and "pond lily." A punch specially constructed for cutting cells from these sheets, can be purchased from the opticians at the small cost of a dollar and a half; and enough to mount a dozen or more slides may be punched in a few moments.



WAX CELL PUNCH.

A turn table is necessary for attaching these cells to the slides, and some form of a self-centering one is recommended; the enhanced first cost, being the only reason for hesitancy in making a choice. A simple form of *centering—not self*-centering, mind you—devised by myself many years since, in my early microscopical days, and which costs but a fraction more than the simplest turn table without it, has been found so satisfactory in my own work, as well as that of many friends who have adopted it, that I am led to describe it here and to give an illustration as well. Indeed, the latter shows the simple device so well that further description is almost useless. A sheet of thin brass with a stop at the left hand end, precisely one and a half inches from the centre, is attached to the surface of the whirling table by a small milled head; by which the distance of the edge of the brass plate from the table's centre may be varied more than half an inch. A slide precisely 3 x 1 inches, having been accurately centred on the table by means of the con-

centric rings turned about the centre of the latter, — and held in position by the usual spring clips, — the guide plate is moved up until the lower left hand corner of the slide rests securely in the angle formed by the upper edge of the guide and the stop at its left; when the milled head is screwed up tight and the centering arrangement is ready to do its allotted work. It follows that any rectangular slide 3 x 1 inches, slipped under the spring clips and into the angle of the guide, must have *its* centre exactly over that of



TURN TABLE.

the table, and a ring of cement once run upon it when so placed, can be followed by as many more as are desirable, by simply replacing the slide in the same angle, without any trouble in adjusting. Since, however, very few slides are absolutely rectangular or have exactly parallel edges, it will be found convenient in practice, to

WRITING DIAMOND.

place a mark upon the left hand end of each before running the *first* layer of cement thereon, after which it may be replaced as often as desired, without loss of time. A writing diamond is the most convenient tool for doing this with, but

a small scrap of paper pasted upon the slide will answer every practical purpose. The surface of the table should be sharply scratched at the angle formed by the guide-plate, so that in the event of having to move the latter to accommodate a slide not originally ringed by it, the centering adjustment may be returned to its original position in a moment and with absolute accuracy. My original device was cut from a piece of stiff card board, and secured to the table by means of the screws which attached the two spring clips to the latter; and this primitive affair did excellent service for many a long year, ere it gave way to my present truly *self*-centering instrument.

Let us take breath, for we have been a long while getting our turn table; but that invaluable instrument secured, at last we are ready for business. Taking a clean slide from our store box of same, we slip it beneath the clips of the table, and bring it to a centre at once, if we have followed the foregoing directions. First dusting its surface carefully with a camel's hair brush, we proceed to trace a flattened ring thereon, with balsam, diluted by chloroform to the consistency of *city* cream, using a small red sable brush for the purpose; ample directions for doing which were given in the preceeding paper. The size of this ring must be the same as that of the cell we are about to place upon it, and the concentric lines turned upon the surface of the table, which are visible through the slide, furnish us with an excellent guide to follow. Which of the three thicknesses of sheet wax we shall use, of course, will be determined by the thickness of the specimen to be mounted: if none, (used singly,) will furnish a cell sufficiently deep we must add one or more rings of the wax, taking care to coat each thoroughly with the balsam before adding the next ring. This may be all done, without removing the slide from the turn table, and thus a symmetrical and accurately centered cell may be built up in a very few minutes; and if necessary, may be at once filled with balsam and specimen, and the mounting completed. It is better, however, to set it aside for a day or two, (in a dust-tight case,) for hardening. And now, having completed our cell, be it of glass, metal or wax, let us proceed to mount our specimen therein, without a legacy of air bubbles, or vacuoles; which is a very easy matter to do—when you once know how.

Suppose that our first specimen is a lot of Foraminiferous shells of considerable size, which will require a cell of the depth, made by

a ring cut from a single thickness of pond lily wax. Choosing such an one from our stock of already prepared cells,—hold the slide very carefully over the lamp, until it feels sensibly warm to the touch, then immediately fill the cell with pure limpid balsam, just sufficiently to reach the upper surface of same all around and to form a slight convexity from side to side. The balsam may be squeezed from a collapsible tube, or lifted from the supply bottle by means of a glass rod, at pleasure; my own preference being decidedly for the former method, as being cleaner, more convenient, and keeping the balsam entirely free from dust, or evaporation. Now gently warm the slide again to the same degree as before and with a clean needle, — well heated over the lamp,—explore the inner edges of the cell down to its glass bottom, so that if there be any vagrant air bubbles imprisoned thereabouts they may be freed, float to the surface and disappear of their own volition, or at the touch of a hot needle point. A careful examination of the cell's contents should be made with a pocket lens, as a further surety that no imprisoned bubbles are left therein. And it may be well to remark here and for all the past as well as future operations, that they should be conducted speedily as possible, since the balsam begins to harden as soon as brought into contact with the air, rendering it more and more difficult to manipulate, the longer the operation lasts. The bell glass should also be close at hand to place over the slide during any pause in the work, to exclude dust.

The small shells, —previously freed from all moisture or dust —may now be carefully dropped into the cell and moved into position with a warm, *not hot* needle, until the desired amount is deposited therein. Examine again to make sure no fugitive air bubbles are left; and now we are ready for the covering in. The glass circle for this purpose should be slightly smaller than the wax ring which forms the cell: thus, if the diameter of the latter be ¾ of an inch, the former should be $\frac{11}{16}$. The covers can be purchased in all sizes, one-sixteenth of an inch apart, from ¼ to 1 inch in diameter.

Taking up the cleaned circle with the forceps and slightly warming it over the lamp, we proceed to apply it to the cell precisely in the same manner as previously described for a balsam mount, in which no cell was employed; care being taken to let it fall gently so as to drive out the excess of balsam over the edge of the cell, and so down on to the surface of the slide, without moving the shells out

of their positions or leaving any *vacuole* within the cell. Should the latter mishap occur, the only remedy is to push the cover off to one side and apply sufficient fresh balsam to fill the vacancy: replacing the cover in position by a gentle sliding motion. This necessity, however, is to be avoided by all means, if possible, since it makes a "*smeary*" job, very difficult to clean off nicely afterward. Should any small air bubbles yet remain, after all our precautions, they need cause no annoyance or thought, as they will disappear of themselves, as do those remaining in mounts made without cells. The excess of balsam that flows over on the slide during the placing of the cover and closing of the cell, should be roughly wiped off with a wisp of tissue paper, so as to leave but a thin layer for the final cleaning, when the mount is hard and complete. Also at this time the cover should be carefully adjusted with the needles or forceps, so as to rest concentrically upon the surface of the cell, equally distant all around its circumference from the *outer* edge of the latter; and should be firmly pressed down upon the cell; and over the same. The cover, however, must never be pressed in its centre, or over the balsam. Being elastic, it readily bends downward under such pressure, driving out a portion of the balsam, over the edge of the cell: the pressure being removed, the glass returns to its former level, drawing in *air* to replace the expelled balsam, and thus compelling us to do our work all over again. The slide should now be set aside in a warm but not hot place, and allowed to thoroughly harden, when the superfluous balsam may be scraped off with a dull knife blade, and the final cleaning made with a rag moistened with benzole, or better—chloroform; after which soap and water will restore the pristine polish of the glass. The *finish* must be left to the taste of the worker. If all the proceedings, thus far, have been neatly and carefully executed, the slide will present an exceedingly neat appearance, without any ring of cement being run upon the edges of the cell, but it will look still better if finished with white zinc cement, and a narrow ring of color, as described in my first paper, care being taken to coat the edge of the cover, first, with shellac, or some other cement, which is insoluble in balsam or benzole.

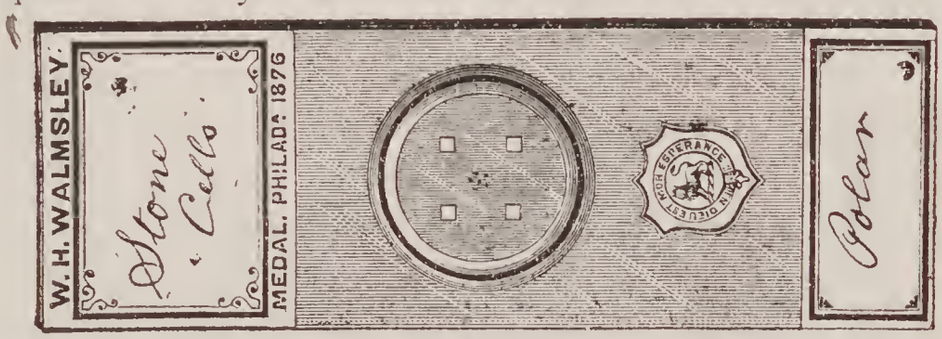
These directions for mounting in balsam with cells of varying depths, and made of sheet wax, are identically the same as though we were using those of glass, metal or other substances. Further, if our specimen, (instead of being dry, as were the supposed For-

aminifera,) has been carried through the preliminary stages of alcohol and oil of cloves, it may be transferred directly from the latter, or from benzole, care being taken merely to drain off all superfluity of either, and to avoid air bubbles in the immersion. Whole insects, large as blow flies, may be thus mounted, without flattening or alteration in shape. Directions for so doing and for rendering them sufficiently transparent may be given in a future paper.

Even the simple wax cell may be beyond the immediate reach of many workers, who may still find a necessity for employing some substitute to prevent the crushing of a delicate object; or to hold the cover parallel over a specimen too thick for the ordinary mode of balsam mounting. For such, the following very simple contrivance can be made to answer a most useful purpose, and at the same time make a very neat appearance. Prepare a number of slips of paper and card-board of various thicknesses, by gumming upon one side. They may be placed in a convenient box for use when required. Selecting a slip slightly thicker than the object we desire to mount, we will proceed to cut four minute squares from it; then placing a cleansed slide upon our mounting plate will stick these squares thereon, at equal distances from the centre. These distances will, of course, be regulated by the size of our object and the diameter of the covering glass, as the latter must cover all the squares when laid in position. The gum is to be moistened, of course, to attach the squares to the slide, and when they are in proper position, the whole must be warmed sufficiently to drive off *all* moisture, which would otherwise cause a milky appearance in the balsam. A drop of the latter having been placed in the centre of the slide and the specimen properly arranged therein, a cover is to be warmed and placed upon it according to former directions, pressing the same down gently with the forceps until it rests equally upon all four of the squares of paper or card-board. Should the object be decentered during this operation, it may be pushed back into position by a flattened needle introduced between the slide and the cover. This useful little tool can be readily made by drawing the temper from a large needle and hammering it out flat upon an anvil or any smooth hard surface of iron or steel; after which one end may be inserted into a match by way of handle. The needle should always be warmed over the lamp before thrusting it beneath the covering glass, to avoid the formation of air bubbles. If the balsam first applied

be insufficient to fill out perfectly to the edges of the cover, more may be added by means of the glass rod. It will flow under the cover by capillary attraction and fill up evenly all around, if the operation be carefully performed. Then come the final operations of setting away to harden (always in a flat position), and the ringing with cement, or not, as the worker's fancy dictates. A mount made in this manner is very simple and easy, requires no outlay for even the materials for the cell, and can be made quite neat and handsome in appearance, as this faithful reproduction of one will testify to the reader's eye.

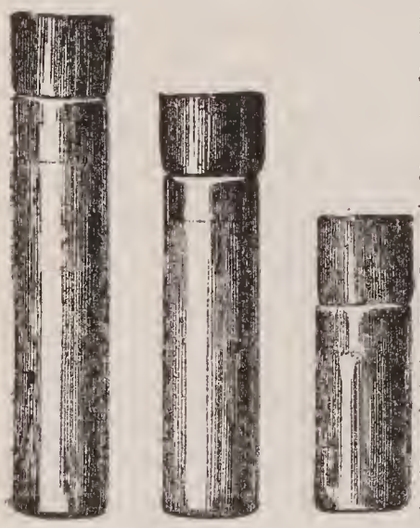
The mounting of diatoms in balsam is probably familiar to all of my readers, and yet, I feel impelled to give a few hints on this branch, albeit at the risk of telling what every one already knows full well. I do not propose to touch upon the cleaning of these at present, but presuming all this preparatory work to have been already well done, I will briefly tell how to mount them in an easy and expeditious way.



SPECIMEN.

For this purpose we shall require, in addition to the tools and materials already mentioned, a glass tube about six inches long with a bore of say $\frac{3}{16}$ of an inch, a homœopathic vial, or still better one made from glass tubing, of the form shown in illustration, and a brass table, larger and heavier than that shown in our first paper, with spirit lamp. Having these ready, with the cleaned diatoms in the stock bottle, and our balsam, (pure), slips, circular covers, and mounting plate, let us proceed to work. Shake the stock bottle carefully until its contents are evenly distributed throughout, then with the glass tube take up two or three dips and transfer to the small vial, which fill with distilled or pure filtered water, and allow the diatoms to settle to the bottom, when the fluid must be carefully poured off, and the vial again filled with water. The object of this is to get rid of almost every trace of the alcohol, which contained

the diatoms in the stock bottle, and which, if not removed, would prevent them from being evenly distributed over the covers. I say *covers*, for diatoms should always be mounted upon these, and not upon the slides. Now place upon the table as many covers as you desire to mount, separated some little distance from each other, and with the glass tube drop a portion of the contents of the small vial of diatoms in water upon each. The vial should be gently shaken between each dip, to distribute the diatoms evenly, and the amount of fluid placed on each cover should be sufficient to extend to the edge, and assume a convex form over it. The diatoms will distribute themselves evenly over the whole surface, care being taken not to disturb them by any jarring of the table. The dip is to be made from the vial by thrusting the tube down nearly to the bottom and closing the top with the forefinger: the contents are deposited upon each cover, by gently raising the finger and allowing the air to enter. A little practice is necessary to perform this successfully always. Our covers now being all ready, with watery burden covering the tiny diatoms, we light our spirit lamp and carefully apply its flame beneath the table, moving it back and forth and occasionally withdrawing it altogether, our object being to slowly evaporate the water, without causing it to boil or in any way disturb the diatoms. As soon as the evaporation is complete, the lamp may be left untouched and the table heated to the highest degree possible, in order to insure a thorough drying of the diatoms, which are now ready for the final mounting.



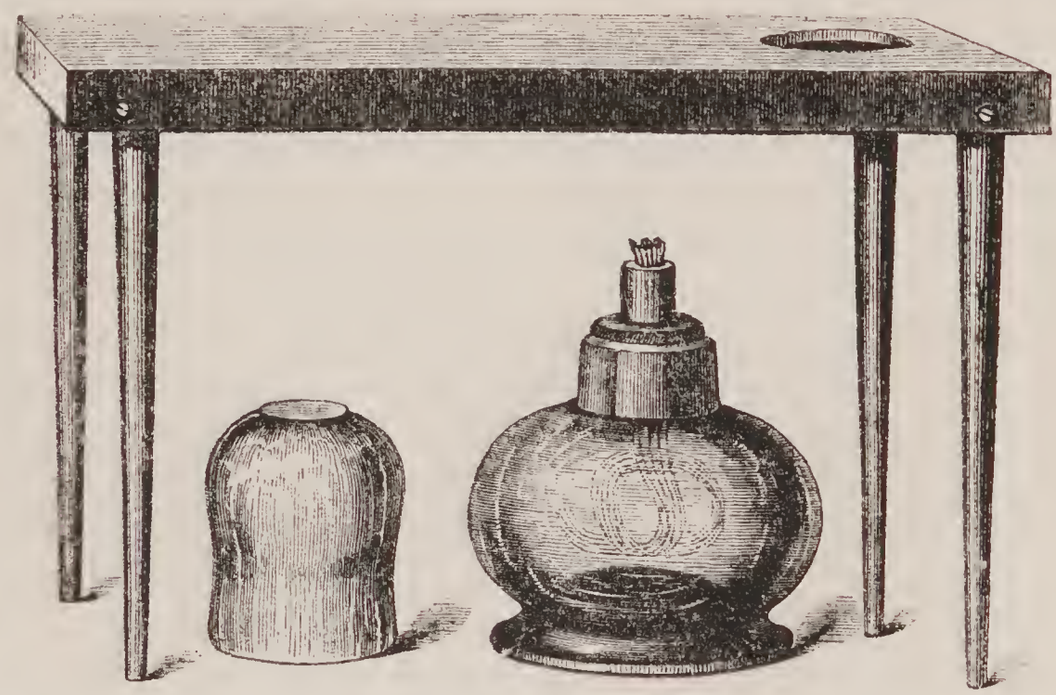
GLASS VIALS.

Place a slide upon the mounting plate and a minute drop of *pure* balsam in its centre, and grasping one of the hot covers with the forceps, turn it over upon the balsam, which will quickly spread out to its edges, and the mounting is complete: done as quickly as I can tell of it. If desired, the slide may be heated over the lamp until all the turpentine is driven off, when, upon cooling, the cover will be found firmly fixed; but the preferable way is to set it aside for hardening in the usual manner. The smallest possible quantity of balsam should be used, and no ringing or other finish is necessary.

And now, having given hints as to various modes of making

balsam mounts, I must bring this second installment of my talks to an end; having reached the limit of my space, without touching upon any other methods of mounting, as was my intention, and which must be left to another time.

It might be inferred, from the length at which I have dwelt upon balsam and its uses, that I held it in supreme regard as a mounting medium. But such is by no means the case. Whilst it is invaluable as a preservative—and mountings made in it are probably nearer to being absolutely *permanent* than any other — it possesses many defects, which render it most unsuitable for mounting many delicate tissues which are so frequently placed in it, thereby becoming almost invisible. There are several aqueous fluids, which



MOUNTING TABLE WITH LAMP.

are far better suited to showing well the structure and beauties of innumerable objects, and these will be treated of in future papers. But their successful use, and the preparation and finishing of a permanent cell, containing them, requires a degree of skill to which the student can only attain by persistent efforts, and many failures; I have, therefore, thought it best to ground him well in the easier methods of balsam mountings,before proceeding to the higher plains. In the next paper, therefore, I propose to treat of Dry Mounts, many of the preliminary processes of which are identical with those required for fluids, and which will serve to lead up to the latter. A

worker who can make his balsam mounts, neatly and without failures, and consequently without saying or *thinking* naughty words, has certainly passed over the roughest portion of his journey, and may look with confidence for a continuously easier road, no matter in how many different directions it may lead him.

LABORATORY NOTES. (*Continued.*)

BY C. H. STOWELL.

HAVING become familiar with the various normal and extraneous matters found in an examination of the contents of the mouth, we are now prepared to examine the sputa in suspected cases of phthisis.

We should become familiar with the appearnce of fragments of lung tissue, as they are found in well established cases of advanced phthisis, before we attempt to diagnose a case by this examination alone.

It is a recognized fact, that phthisis is diagnosed, by an examination of the sputa, weeks and months before other signs are manifest.

We cannot discuss here the value of fibres of lung tissue — yellow elastic fibres—when found in the sputa. There are many exhaustive articles on the subject, and our readers are referred especially to "Richardson's hand-book of Medical Microscopy" for a full explanation.

Some special directions should be given to the patient whose sputa we are about to collect. First, the mouth should be carefully and thoroughly rinsed, and teeth brushed, after each meal. Second, the vessel in which the sputa are collected should be scrupulously clean. Third, if the patient uses tobacco, it should be denied him during the collection of the sputa, as the fibres of the leaf might mislead and cause a wrong diagnosis. The sputa first raised in the morning should be preferred for examination, but if this should prove too small an amount, then the sputa for the whole twenty-four hours should be saved.

Any little grayish matters should be chosen and placed at once under the microscope. Acetic acid will render the fibres, if present, more distinct, by clearing up the mucus, etc.

Figure 1 shows fragments of lung tissue, from an early stage of phthisis, prepared as above. If this examination reveals nothing, then manipulate as follows: Make a solution of sodic hydrate, 20 grains to the ounce of water. Mix the sputa with an equal bulk of this solution, and boil. Then add to this mixture four or five times its bulk of cold water. If possible, pour into a conical-shaped glass and set aside. Soon the yellow elastic fibres, if present, will fall to the bottom; from there they can be drawn up with a pipette and examined.

Several slides should be examined at a single sitting, and the examination should be repeated every few days until the presence or absence of these fibres is satisfactorily demonstrated.

During our holiday vacation we had the pleasure of having with us our older brother, Prof. T. B. Stowell, A.M., Ph. D., and together we mounted over six hundred histological specimens. We were very much pleased with the action of Dr. Woodward's violet-carmine. We were first induced to try this, from a description of it in Dr. Seiler's work, p. 63. The sections are placed in the staining solution from thirty seconds to one minute, but they may be left longer with-

out fear. Dr. Seiler says—"they are then placed in what is termed a fixing solution, composed of—

Hydrochloric acid (C. P.) 1 part,
Alcohol (95 p. c.) 4 parts,

and allowed to remain therein until their color has changed from a lilac to a rose color. The action of this fixing solution is to remove the excess of color and to bleach all other parts, except the nuclei, which retain the carmine staining in spite of the action of the acid, so that they alone are brilliantly colored red." If it is desired to have other parts retain the staining also, then a much weaker solution of the acid in alcohol should be employed.

We have also used Dr. Seiler's Sulphindigotate of Soda. A few drops are added to some alcohol and the sections placed therein. Thus the sections are colored and dehydrated at the same time. Double staining with aniline blue and carmine has given us beautiful sections, especially of the ovary. We have sections that show the graafian follicles, the discus proligerus, germinal vesicle, and germinal spot, all together as clear as a diagram could picture them and doubly stained also.

A specimen was recently sent us from a neighboring state, with the physician's statement, that the uterine discharges contained these peculiar fibrils, "the fibres of a uterine tumor." Placed under the microscope, the fibrils were seen to belong to the vegetable kingdom. The physician is at a loss to account for the fact; we suggested that perhaps his patient was using some decoction for a wash and would not admit the fact to her physician.

A new way of mounting butterfly scales is to dissolve one part of Anthony's "French diamond varnish" in two parts of pure benzole. Apply a drop or two of the solution to a slide, and in a few seconds, or as soon as the varnish has set, press the wing of the butterfly gently upon the slide, and then carefully lift it away. The scales will be found transferred to the slide in their beautiful natural arrangement on the wing. Make a shalllow cell around the mounting and apply the cover-glass. Canada balsam must not be used, as it disarranges the object.—*Am. Month. Mic. Journal.*

Editorial Department.

"THE AMERICAN SOCIETY OF MICROSCOPISTS."

WE have before us the proceedings of this society, held at Columbus, Ohio, August 9th to 11th, 1881.

It forms a volume of 116 pages, including six full-page plates. The printer has performed his work well. It remains for us to review the work brought before the society. Ten original papers were presented. The first paper, as placed in the report, was given by Dr. Redding, of Falmouth, Ind., upon "Muscular Contractility." It would be useless to attempt a full criticism of this paper in the space at our disposal, but the writer has failed completely to convert us. In the first place, the histological description of the tissue experimented upon is incorrect. We are not prepared to call each sarcous element "a cell." We are told—"the fibrillæ are composed of cells." We believe that in living muscle there are no fibrillæ; the arrangement into discs or fibrils depending upon various causes, alcohol giving the fibrillæ and hydrochloric acid the discs. Authors have not "ignored," neither have they "remained silent upon the structure" of these sarcous elements. Brücke says they consist of minute doubly refracting elements, and he has named them "disdiaclasts." A transverse section of these elements "presents a fine granular appearance, leading one to believe that they are composed of most minute fibrils," (see Stowell's Histology, p. 102). During the contraction of a muscle the "contractile disc" becomes more transparent, shorter in its longitudinal direction and broader in its transverse. Now the "contractile disc" is composed of thin, oblong rods, called sarcous elements, — the "cells" of our writer, — thus when this disc becomes changed in shape, as described above, each element participates in it, that is, each sarcous element becomes shorter and thicker, "due probably to a translocation of its molecules," (Foster). The drawings that accompany this article are so decidedly diagrammatic that they are liable to mislead.

The second paper—"Tumor of the Left Auricle," by Dr. Kinsman, of Columbus, shows the author to be a practical man and a very close observer. The history of the case, the location of the growth,

the careful examinations and the illustrations combine to make this a very interesting paper.

In our opinion, however, none of the papers rank higher than the one on "A Study of Blood", by Prof. Curtis, of Chicago. While we are not prepared, at this time, to place ourselves on record concerning the net work of the white blood-corpuscles, yet we do say that the more we investigate the subject, so much the more are we inclined to accept Prof. Curtis' explanation, namely: that it is an "optical delusion." Again, the paper is of permanent value, because it throws light upon the subject of the small granules found in the blood, and the granular corpuscles themselves. The paper is given in full in this number. The vice-president—now president—ably discusses the question of adjustable or non-adjustable homogeneous-immersion objectives, and he proves that "adjustment of some kind will always be necessary." The society has given us a glimpse of its power; what shall we expect from the Elmira meeting?

The meeting is called at Elmira, N. Y., August 15th, at 10 a.m., and will continue about four days. The president, Dr. Blackham, has kindly furnished us with an idea of the work to be presented. The following are some of the titles of the papers that have been promised:

"The Microscopic Organisms in the Niagara river."

"The Status of the Microscope in Court."

"The Diatomacæ and Entomostracæ of Steuben Co., N. Y."

"On some Subject in practical Optics."

"On a new Rotifer."

"Several papers on adulteration of foods and drugs."

The president also writes us, that we can confidently expect the report of the committee on eye-pieces. This cannot help but be one of the most valuable papers of the meeting and it will be waited for with great interest. No more competent person could be found in this country to head the committee than Dr. R. H. Ward, of Troy, N. Y. Now that we have a standard "society screw", we can think of nothing more desirable than uniformity in size and nomenclature of eye-pieces. Theoretically we need it, and practically it is a marvel how we have tolerated the present evil so long. A favorable report of this committee next August will make the Elmira meeting a grand success and will place every microscopist under lasting obligations to the committee.

Aside from the regular president's address, Dr. Blackham informs us that he intends to give a "report"; a resumé of the year's work for the society and of the progress of microscopy in this country. Thus, one climax follows another, until there can be no question but that the Elmira meeting will be a memorable one, a meeting that will mark, we trust, the commencement of increased microscopical work in this country. Encourage this meeting by your presence, by your papers, and by your kind words. Show your interest in your work, as Mr. Griffith has done, and let other prizes be established, and THE MICROSCOPE is ready to take the lead.

One thing, however, we venture to suggest to the officers of this society, namely,—the establishing of a journal that shall be in keeping with its character and ability.

The society itself is abundantly able to support it, both in a financial and literary sense. All official papers and announcements should appear in its columns. It should contain the "proceedings", together with all papers presented at the annual meetings In plain words, it should be the distinct organ of the society. The society should be responsible for it, and should be the publishers of it. The editor should be selected by some committee appointed for the purpose, and the president elect should be the associate editor. Each member of the society should be entitled to a year's subscription from the time he pays his dues, and said dues could be raised to correspond with the increased expense.

There is no reason why the "American Society of Microscopists" should not be as well represented as the Royal Society of London. It stands a shame to us that we ever let such journals as *The Lens* and *The American Quarterly Microscopical Journal* fail for want of financial support.

"THE MICROSCOPE" will aid such a journal in every possible way. We repeat it,—the time is at hand, the society is able, the science demands it, microscopists need it, shall it be done?

PROSPECTUS FOR VOL. II.

WE do not propose to dwell upon the past. That our journal has changed since we started is evident to all. We know better to-day what our readers desire and we publicly thank our

friends for their kind criticisms and suggestions. We know we have grown, as a result of our six appearances in public.

Volume II shall greatly excel volume I in many ways. Our general plan of giving plain, practical help will remain the same, but the journal will be exclusively devoted to practical microscopy.

Among the good things in store for the readers of Vol. II will be the following:

"The history of the microscope and microscopical accessories." By J. W. Crumbaugh, M.D., of Philadelphia. The first article will appear in our next issue and will be continued throughout the year.

"Continuation of the articles on mounting and staining." By W. H. Walmsley.

"Some articles on practical optics, and the manufacture of microscopes." By Mr. E. D. Bausch, of the firm of Bausch and Lomb, Rochester, N. Y.

Prof. Allyn Y. Moore, M.D., of Cleveland, will contribute an illustrated article in our next issue on the structure of the red blood-corpuscles. Prof. Moore has been studying this subject at great length, and will give our readers solid proof of a very important discovery.

Geo. E. Fell, of Buffalo, treasurer of the American Society, will contribute later in the year. Articles are promised from "Grey Beard," R. N. Reynolds, Prof. Lobdell, and many others. Three full page lithographs of urinary crystals are all ready and waiting for room. We promise first-class press work, as good as we are enjoying from the publishing house of Geo. S. Davis.

Renew promptly, please, and we will promise a good journal for volume II.

WE have had the pleasure of examining a number of mounts of arranged diatoms, the work of Dr. F. S. Newcomer, of Indianapolis. They are models of neatness and good taste, and we doubt if they are excelled in this country.

DO you wish volume II of "THE MICROSCOPE"? Then renew at once.

DR. Bion Whelan, of Hillsdale, Mich., bought a Bausch and Lomb microscope, through us, about the middle of December last. He writes:—"I have not had the instrument six weeks, yet I have made enough money, by examining specimens for neighboring doctors, to more than pay me what it cost."

"GREY Beard" gave us our first "renewal." It reached us on the first of December. N. R. Reynolds followed in a day or two; evidently they did not wish their journals discontinued.

THIS number completes volume I of THE MICROSCOPE. The great majority of the subscriptions expire with the volume. To insure the prompt receipt of the April number, it will be necessary that you send us your renewals at once. Club rates given upon application. Be prompt in this matter, for we shall surely discontinue the journal at the expiration of the time paid for.

A VISIT from Mr. E. H. Griffith, a few evenings ago, lightened our work and started us on fresh pursuits after things microscopical. His "Griffith club microscope" should be named "multum in parvo."

THE "Typical Stem" was the subject of an excellent address by Mrs. Stowell, of the Ann Arbor university, last evening, before the Griffith club of microscopy. Her remarks were worthy of the verbatim short-hand report that was taken by Mr. Flowers for publication, but, owing to the unanticipated need of an engraving, similar to the diagram placed upon the black-board, it is necessarily omitted. The meeting was largely attended by the leading scientific gentlemen of the city, who warmly complimented Mrs. Stowell upon her address. At the conclusion of the address Mrs. Stowell was elected an honorary member of the society.—*Evening News, Detroit, Jan. 4th, 1882.*

THE microscopical soirée in Room A, last evening, was a complete success. There were thirty-seven microscopes in use during the whole evening, each superintended by one of the students, who gave to each gazer an explanation of his specimen. A continuous line of people was moving around in order to the different microscopes, and many were the exclamations of admiration that passed their lips. One of the most beautiful specimens was the circulation of blood as seen in a frog's foot. Another was the Brazilian beetle. A crowd was about these two microscopes the whole evening. About 100 different choice specimens composed the list. The net receipts for the evening were about $35. Thus the Athletic Association gets a boom. Thanks are due Prof. Stowell for his exertions to make the entertainment a success.—*University Chronicle, Dec., 1881.*

MR. H. R. Spencer, son of the late Chas. Spencer, writes us that we are at liberty to state that the engraving of his father is an accurate likeness and his friends think it "superb."

WE have received many letters and a number of press notices speaking in the highest terms of Mr. Walmsley's first practical article. Renew your subscription and secure the series.

OWING to an unusual press of matter, we treat our subscribers to eight extra pages of interesting reading matter this issue, making 200 pages for the volume just closed.

DEAR DOCTOR:

An undertaker wants to know what causes the peculiar smell about his goods and articles in use common with all undertakers. Is it a fungus growth in the crape or from the body. The strong peculiar smell is quickly absorbed in clothing and can be detected for several days afterwards. Is there any disinfectant for this?

J. M. A.

Will some of our readers answer these queries?—ED.

Selections.

A MICROSCOPICAL EXAMINATION OF THE ROOTS OF APOCYNUM CANNABINUM AND APOCYNUM ANDROSÆMIFOLIUM.—Although learning soon after taking charge of the laboratory of Lord,Stoutenberg & Co., that the drug furnished by collectors and secondarily by dealers as Apocynum androsæmifolium was identical with that sold as Apocynum cannabinum, my attention was more strongly drawn to this fact on the appearance last year, of Prof. Lloyd's Suppliment to the American Dispensatory and it was not until that time that a study of the microscopic characters of the two drugs as likely to afford a means of distinguishing the two species suggested itself. It is true that the naked eye appearances of these two roots are sufficiently distinct to render their identification, when entire, a matter of no difficulty, but, overlooking the fact that the greater number of retail dealers do not, and in the Western market at least, cannot ordinarily find it among their wholesalers except pressed, ground, or powdered, it was thought that this description might be of some value. It will be admitted that some general method, by which ground and powdered drugs can, without too great an expenditure of time, or the possession of a high degree of technical skill, be distinguished from each other, and also from the articles used as adulterants and substitutes, is highly desirable. Inasmuch as the compound microscope affords the means of making such examinations, and more nearly fills the conditions of rapid work and ease of manipulation, and at the same time affords the unmistakable results of any method in use, it is hoped that the results of this examination may serve to direct attention to its value in this field.

The following description of the gross characters of apocynum cannabinum are from the work just referred to: "This root, when gathered in the autumn and dried, is about one-third of an inch in diameter, wrinkled longitudinally, and marked by occasional transverse fractures through the bark, which show the white central portion. It consists of a bark, externally ash grey in color, beneath which is a thin brown corky layer, and within this the inner bark,

*Read before the American Pharmaceutical Association, 1881, by Mr. E. B. Stuart.

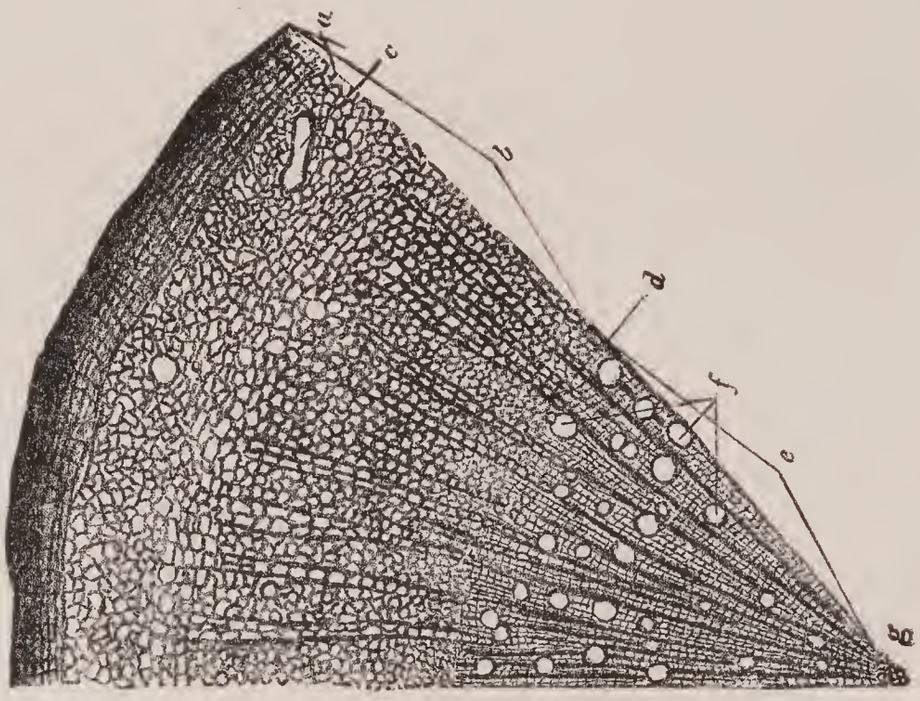


FIG. 1. Apocynum Cannabinum, Transverse Section. *a*, Cork Cells; *b*, Cortex; *c*, Laticiferous Ducts; *d*, Cambium; *e*, Wood; *f*, Dotted Ducts; *g*, Pith.

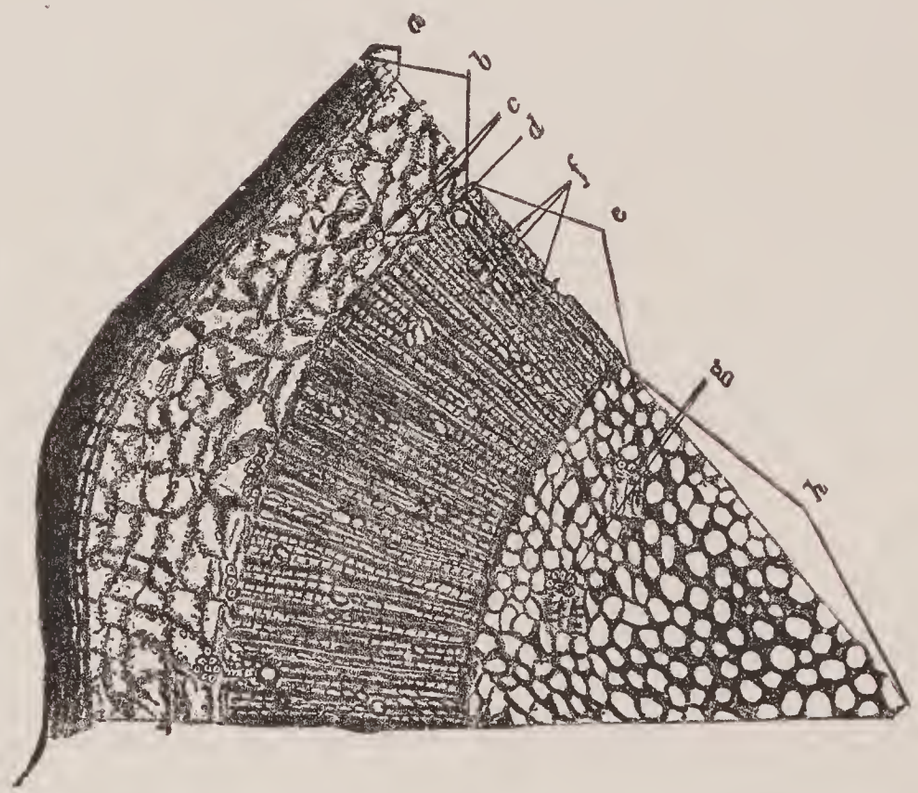


FIG. 2. Apocynum Androsæmifolium, Transverse Section. *a*, Cork Cells; *b*, Cortex; *c*, Bast Cells; *d*, Cambium; *e*, Wood; *f*, Dotted Ducts; *g*, Bast-like Cells; *h*, Pith.

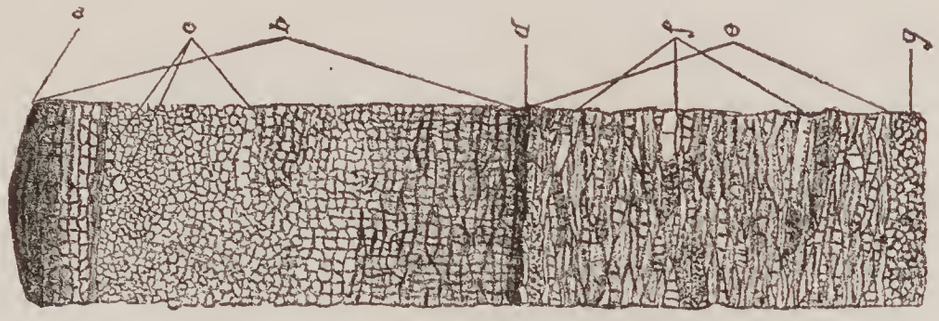


FIG. 3. A. Cannabium, Vertical Section. *a*, Cork Cells; *b*. Cortex; *c*, Laticiferous Ducts; *d* Cambium; *e*, Wood; *f* Dotted Ducts; *g*, Pith.

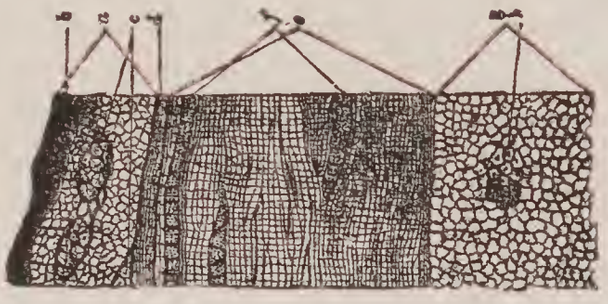
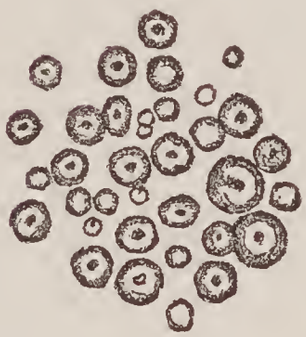


FIG. 4. A. Androsæmifolium, Vertical Section. *a*, Cortex; *b*, Cork Cells; *c*, Bast Cells; *d*, Cambium; *e*, Wood; *f*, Dotted Ducts; *g*, Pith; *h*, Bast-like Cells.



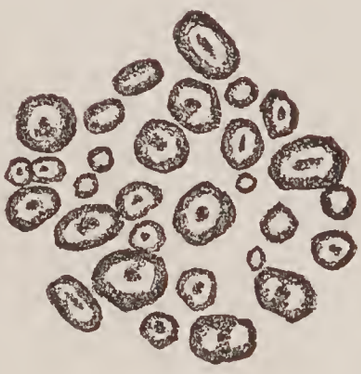


FIG. 6. FIG. 7. FIG. 7.

FIG, 5. Starch of A: Cannabinum. FIG. 6. Starch of A. Androsæmifolium.

In figure five, ten lines of the appended scale are equal to one one-hundredth millimetre, and in figure six, thirteen lines are equal to one one-hundredth millimeter. By comparison with a metrice scale (Fig. 7) it will be seen that one is magnified about 650, the other about 800 diameters.

The figures 3 and 4 are drawn to the same scale, each being magnified about 20 diameters. Figures 1 and 2 are not drawn to scale. The specimens from which these examinations and drawings are made were furnished by Prof. J. U. Lloyd, of Cincinnati.

which is of a pale pink color. The remainder of the roots is composed of white medullary matter, perforated by numerous white longitudinal tubes or ducts, disposed more thickly in concentric circles about the fortieth of an inch apart, or forming a single circle. Radiating from these are delicate medullary rays. When gathered in the spring or early summer, the center is pierced by a light pith or a small cavity. The root when dry is brittle, and snaps readily, giving a clear, smooth fracture. As found in the market there are few, if any, fibers attached, although when fresh the root is well supplied with secondary roots, but as they are very brittle when dry, they do not long remain attached." Its microscopical characters are: First, an epidermis of a single row of cells which adheres but loosely to the root; next, a layer of cork varying from four to seven cells in thickness in the specimens examined, the outer rows of which have strongly thickened walls, the inner, less so, and constituting a layer of cork cambium, or meristem. These cells are separated by a tolerably well defined boundary from the inner cortical tissue which occupies in general about one-half the diameter of the root. The cells composing this structure are in the outer portion of the zone, quite irregular in shape and size, assuming greater regularity, and decreasing somewhat in size toward the center, where they approximate to a spherical form. Large laticiferous ducts are found in abundance in this proportion of the root and the cells of this tissue are generally well filled with starch granules, and when fresh, protoplasm. This zone is limited, interiorally, by a narrow line of cambium, the cells of which are exceedingly difficult to distinguish after the specimen has been dried, and this in turn is succeeded by the medullary sheath, or woody tissue of the root, which, with the exception of a few cells of the semidiameter of the root. The cells of this tissue are lignified (or woody), and it is composed of three histological elements, comprising large dotted ducts, medullary rays, and prosenchyma. The dotted ducts are numerous and plainly visible to the naked eye, but otherwise present no peculiarity. The medullary rays, springing from the central pith and from the annular rings, extend plainly half or two-thirds through the inner bark, where they loose themselves in the general tissue, and are composed, transversely, of one, and in their vertical direction of an indefinite number, while the medullary cells are, in the transverse section of the ray, elongated, and verti-

cally are nearly round. The prosenchymatous cells present no features requiring description.

The starch of Apocynum cannabinum, as previously stated, is found in the cells of the inner bark. The granules are exceedingly irregular, both in size and shape; they are in fact sufficiently so to make this feature somewhat characteristic. Several successive measurements of twenty grains, taken so as to include, as nearly as possible, all in a given space, gave an average long diameter of .0082 millimeter and .0074 millimeter short diameter. The extremes, so far as measured, were .014 millimeters maximum, and .0025 millimeter minimum. In shape, the more perfect granules are nearly oval, others approach angularity, or are variously contorted, while the smaller grains are nearly round.

In the center of the woody column are a few nearly spherical pith cells. Bast cells, although a prominent feature in the bark of the stem, were not observed in any of the specimens examined.

Apocynum androsæmifolium has a long, running root. When dry it is contorted, frequently having the woody remains of its stalks attached. It is shriveled longitudinally, and often marked by transverse fractures, that, extended through the bark and scales off. The root breaks with difficulty, its central part being woody. Externally, the bark is dark brown, white upon its inner surface, and readily separates from the central or ligneous part of the root; it is very bitter. The central part of the root is smooth and firm, bends before breaking, and usually requires considerable twisting before the woody fibers give way. Attached to the root are rootlets, not very plentiful, which bear a general resemblance to the main root, their central portion being woody, and covered by a brown epidermis. The root of Apocynum androsæmifolium presents the following histological characters: First, an outer layer of cork, usually from three to six cells in thickness; next, a zone of cortical tissue made up of irregularly shaped cells containing starch, this tissue occupying generally about one-eighth the distance from cortex to center of the stem. The inner portion of this zone contains many bast cells, the walls of which are strongly thickened; they are arranged in groups, are quite regular in size and form when examined in transverse section, and from this view show, like starch grains, a cross under polarized light. The successive layers of their walls, also, show as well marked striæ. Numerous intercellular spaces are seen in this

portion of the cortex. Lying next this tissue, which may be designated as liber, is a narrow ring of cambium, somewhat more prominent than the same structure in Apocynum cannabinum, but in the dried root somewhat difficult to resolve into its cellular elements. It appears, however, to be, when fresh, made up of very delicate, thin-walled, nearly spherical cells; or, in other words, it presents no peculiarities distinguishing it from cambium tissue in general. The woody portion of the root succeeds the cambium and is, as in apocynum cannabinum, made up of prosenchyma and dotted ducts, interspersed with medullary rays; it is considerably narrower, proportionally, than in its related species, the pith occupying a correspondingly larger space. None of its cells are sufficiently marked, to present any distinctive points between the two, that otherwise would be of value in the examination of the drugs when finely ground or powdered. The pith cells are large and very irregular in form and size. Bundles of elongated cells with strongly thickened walls are found in this portion of the root. The starch, in this species, is exceedingly small and might easily be overlooked unless highly magnified. The granules are tolerably uniform in shape, being generally nearly round or oval, and are far more uniform in size then in the species first described. An average of twenty measurements gives a mean diameter of .00498 millimeter. The largest measure was .0075 millimeter, the smallest .00375 millimeter in diameter. The difference between the starch granules of these two species of Apocynum are so great as to render their distinction by a mere microscopical inspection an easy matter, while the peculiar bast cells of Apocynum androsæmifolium afford an additional feature of value, and the pharmacist familiar with the microscopic appearance of the drugs, could determine which of the two was offered, at a glance. The entire operation of mounting the powered drugs on glass slips, and making such a comparison, should not exceed five minutes. Few of us are so busy that this brief period cannot be spared. The method is applicable to nearly all the powdered drugs of vegetable origin that we use, and the results of such an examination are in this class of drugs, more reliable and certain than any other method affords. I may be within the limits of reason in expressing the belief as well as the desire, that a microscope will, in the near future, be regarded as essential to a pharmacy as a test tube rack now is, and that the ability to use it will be ranked among the ordinary qualifications of the "drug clerk."—*The Druggist.*

A STUDY OF BLOOD.

In the *Transactions of the American Medical Association* for the year 1875 appeared a paper by Dr. Louis Elsberg, of New York City, entitled, "Notice of the Bioplasson Doctrine." It gave the results of some researches carried on in the laboratory of Dr. Carl Heitzmann, formerly of Vienna, but now of New York, and was concerned with the structure of the cell.

According to these observations, every cell contained fine fibres which branched and inosculated and formed a close net-work, which filled every part of the cell. This net-work was supposed to exist in all cells, its contractions and relaxations to constitute the amœboid movements of cells; in short, it was supposed to be the living matter of the cell. Before this time Dr. Heitzmann himself had described the same thing in a paper before the Vienna Academy of Sciences, in the year 1873, entitled "*Bau des Protoplasms.*"

Very little notice was taken of the subject at first, at least in this country. But of late several papers on the subject in Europe, and especially its favorable notice in Klein's Atlas of Histology, have given it more prominence.

The subject is one which differs from ordinary histological subjects, such as the structure of a gland, or the termination of a nerve, which persons interested in some other department of biology can afford to ignore. It is concerned with the very foundations of physiology and histology. It is of as much interest to the botanist, the diatomist, or the student of life in any form, as to the student of human physiology and histology. If the doctrine prove true, we shall have made a long step in advance in the understanding of cell growth, and shall have to unlearn many things which, until now, we had supposed settled. As I am occupying a position where I am expected to have some knowledge of my own about such things, I have looked into the matter for myself.

In order to make sure of pursuing the right course I wrote to Dr. Heitzmann, asking him his method of demonstrating the structure, and received the following reply:*

NEW YORK, June 30, 1879.

LESTER CURTIS, M. D.,

Dear Doctor.—In *reply* to your favor, date June 27, '79, I have to say as follows: The Lens for seeing the structure of Protoplasm must be a first class 1-10 Immers., such as I use of Verick's, Hartnack's, Grunow's and Toles' manufacture. Just the reticular structure itself is the best test for a lens, so far as my own experience goes.

*I publish a careful copy of this and the following letter, by Dr. Heitzmann's permission.—L.C.

Take a drop of pus, fresh, without adding anything, and you will see the wonderful structure in each pus corpuscle with great ease.

Prick your skin on the palmer surface of the thumb, transport the drop on a slide, and cover right away with a thin covering glass, the edges of which have been oiled, so as to prevent evaporation of the fluid. In the perfectly fresh blood you will see the structure in each colorless blood corpuscle.

Add to a drop of fresh blood a small drop of 40 per cent. solut. of bichromate of potash; this will within 1 hour extract the hæmoglobin, and you must succeed in seeing the reticular structure in each red blood corpuscle.

Keep ordinary yeast (Torula cerevisiæ) for a fortnight in a 30 per cent. solut. of Bichromate of potash, and examine a drop with a good 1-10 Immers. lens. You cannot fail in seeing the net-work in each oidium.

Take any protoplasmic body, best epithelium, cartilage, etc., best kept for a few weeks in ½ per cent. solution of chromic acid; take any fresh living protoplasm, such, as for instance, an amœba from an infusion, and you must see what is to be seen with accuracy. If you fail, come to New York to my laboratory, top-floor of my residence, and after two hours you may leave for Chicago, with the satisfaction that the net-work in the protoplasm is plain. About 400 gentlemen have seen it so far in my place.

Yours truly,

Dr. C. HEITZMANN,
37 West 45th Street.

On receipt of this, I repeated the experiments as directed. The glasses I have used are a $\frac{1}{10}$ immersion, made by Wales in 1874; a pretty good glass for one made at that time. It has, in my hands with sunlight and a slip of blue glass, gone through Möller's balsam *probe platte* without difficulty. I also used a Powell & Lealand $\frac{1}{16}$ made later in the same year. With this glass I have glimpsed the lines on the dry *amphipleura* by simple lamp-light, without any substage appliances whatever. In Mr. Tolles' hands, by the use of his traverse lens, it showed the lines on number 20 of the *probe platte* fully as well as one of his earlier duplex $\frac{1}{10}$s, although, since that time, I have seen the diatom better with one of his later $\frac{1}{10}$s. I use a stand made by Bulloch, fitted with a Powell & Lealand achromatic condenser. I find that for making out delicate anatomical structures, with the use of high powers, the condenser is indispensable.

I began my investigation by the study of blood as directed by Dr. Heitzmann. I split off a thin film of mica and oiled the edges. I then pricked my finger with a needle, put a drop of blood on a slide and covered it immediately with the mica. I began the examination with the $\frac{1}{10}$. On bringing a white corpuscle into view, I thought, at first, that I saw the net-work; a number of fine lines appeared, crossing the corpuscle in all directions, but the outlines of the red corpuscles in the field were indistinct. The glass had been used in examining objects protected with a thicker cover, and was

not adjusted for such a thin film as I was then using. In order to improve the definition I turned the screw collar. As I turned, the outline of the corpuscles grew sharper, but the net-work became more indistinct. Finally, when the outline of the corpuscle came out clear, I could see nothing of the net-work. Instead, the corpuscle appeared to be covered with small nodules of unequal size, placed at irregular intervals.

I went through nearly the same experience when, in place of the $\frac{1}{10}$, I put on the $\frac{1}{16}$. At first, before the cover adjustment was right, an indistinct appearance resembling a net-work was seen. But, when the adjustment was such that the outline of the red corpuscles in the field was sharpest, the same thing was seen as with the $\frac{1}{10}$, only with greater clearness. I could, with the $\frac{1}{16}$, by toying with the fine adjustment, focus the top of the nodules, while the remainder of the corpuscle appeared in shadow; and then, by gently lowering the glass, I could bring the valleys into view and leave the tops of the nodules indistinct. By changing the direction of the light, I could make the nodules cast shadows in first one direction and then in another. With all the care I could use, I could get no other appearance of a net-work than I have described as showing when the adjustment of the glass was wrong.

Having an abscess handy in my own person, I next examined some fresh pus, first with the $\frac{1}{10}$ and then with the $\frac{1}{16}$, as I had done with the blood.

The pus showed very nearly the same as the white blood corpuscles, possibly more distinctly. Several of the pus corpuscles were packed full of dancing granules. The movement of these granules seemed to be independent of each other, and reminded me of small animalcules imprisoned in a narrow space. By fixing my attention on one of them and watching it for some time, I have seen it change its location and travel nearly half way across the corpuscle before escaping from view.

I next put a drop of blood on a slide, and added to it a small drop of a 40 per cent. solution of bichromate of potash. After an hour or two, I examined the red corpuscles with the $\frac{1}{10}$ and $\frac{1}{16}$ as I had done with the fresh blood. Many of the corpuscles had lost a good part of their color. With the color, they had also lost the smooth surface which they usually possess in the fresh state. The edges were finely crenated, the surfaces were thrown into nodules

and ridges, and all the corpuscles were pinched and shrivelled, and were much smaller than the fresh corpuscles, appearing as though acted upon by an astringent.

I took the trouble to measure seven of these corpuscles in a given area of one field of the microscope. They were as follows, measured in both directions, and given in parts of an inch:

(1)	1–6,000	1–4,500
(2)	1–5,000	1–5,200
(3)	1–4,500	1–3,700
(4)	1–4,500	1–3,871
(5)	1–4,275	1–3,946
(6)	1–6,000	1–3,461
(7)	1–3,461	1–4,687

Here, also, I failed to get satisfactory evidence of the existence of a net-work; though the shadows between the ridges and elevations might resemble one.

I carried my investigations to this point, and, after carefully reviewing my work, to be sure I had made no mistake, I wrote to Dr. Heitzmann again. I told him how I had proceeded and what I had seen; I also enclosed some drawings of white corpuscles as they appeared to me, and some of red corpuscles which had been acted upon by the 40 per cent. solution of bichromate of potash, and asked his interpretation. He sent me the following letter:

NEW YORK, Febr. 8, 1880.

Dr. LESTER CURTIS:

My Dear Doctor.—I have read your letter with great interest. It merely proves how difficult it is to learn microscopy as an autodidact without the assistance of a reliable teacher. The net-work is seen plainly when the peripheral contour is not plain; in a globular body the central portion shows the structure best when the periphery is out of focus. You evidently did not learn to discriminate between different layers in one and the same corpuscle, as illustrated by your sketches. You draw everything—in and out of focus. You should draw only what is clear and sharp in ONE focus. Look at the Histology Atlas by E. Klein and Noble Smith, first volume (1879. Lippincott publishers). E. Klein is the best microscopist of London, England; he draws the net-work even nicer than it really appears, and gives me credit for the discovery.

Purchase for a few cents the recently issued Researches on red blood corpuscles by L. Elsberg (1879. Putnam Sons, N. Y., publishers) and you will see and learn everything you desire. You evidently are a good faithful man. Could not you come to New York in my laboratory? Here you would learn more in one day than you possibly can learn home in months.

Yours truly,

Dr. C. HEITZMANN.

On the receipt of this letter I was, of course, dismayed at my great presumption in attempting to make out the structure of a blood corpuscle with a $\frac{1}{16}$th of an inch object-glass; a task so much more difficult than resolving the *amphipleura* that no ordinary mortal may ever hope to accomplish it. But I could not resist the temptation to return to the subject. Accordingly, I re-studied the white corpuscle. I found that when I had, by careful manipulation, succeeded in focusing the bottom of the valleys, I could go no further, the slightest touch of the fine adjustment, the slightest pressure upon the limb of the instrument, even, would cause a blurring of the image. I tried again and again, and am obliged to confess that I cannot focus different planes of a white blood corpuscle.

While I was doing this my mind would keep reverting to the war once waged over the structure of diatoms; how the nodular surface of *pleurosima angulatum* was supposed to be covered with hexagons so strikingly similar, in some respects, to this net-work; and I remembered how the whole thing was cleared up when object-glasses and modes of examination became more perfect. The idea would keep coming to me that this net-work, also, was an optical illusion, explained in the same way.

I began a series of persecutions of my friends. I importuned almost every one that I knew, who had a microscope, to look over the subject and tell me what he saw. Some of these were persons of recognized skill in microscopic manipulation. Some, even, have a national reputation. Many were kind enough to do as I requested, but no one was able to see the net-work. Indeed, I have never seen any one who claims to have seen it. A few have allowed me to use their names. Dr. H. A. Johnson, of this city, carefully went over the ground with me, using a superb new Tolles' $\frac{1}{10}$ and a new Zeiss $\frac{1}{12}$ homogeneous immersion. He considers what I have described to be true appearances. Dr. Sternberg, of the United States army, has studied the white blood-corpuscle especially, with the best appliances at the command of the government. He tells me that he has never seen such a net-work.

A professor in one of the medical colleges in this city, in one of his lectures, described the net-work, as given by Klein, as a new discovery. Later in his course he corrected this statement, and said that subsequent investigation had convinced him that the net-work was an optical illusion. This was done independently of my work.

I might increase this list, but do not feel justified in using the names without permission.

As to Dr. Heitzmann's criticism of my drawing, I will only say that I had supposed a drawing for scientific purposes to be good, not as it left out objectionable details and improved upon those represented, but just in proportion to the accuracy with which it reproduced the appearance seen. It has always been my aim to represent objects as nearly like what I saw as I could. Any other course has seemed to me to be not only bad drawing, but absolute dishonesty.

While engaged in these studies, I met with certain bodies which I have not seen described elsewhere just as I have seen them, although Dr. Osler and others have spoken of having seen something like them in the blood of the lower animals.

The bodies are minute granules. They can be seen in blood, with a good high-power glass, without the addition of any re-agent, but are best seen after staining. If, while studying blood with the microscope inclined, a drop of carmine staining fluid be placed at the upper edge of the covering-glass, there will be seen bright red points sliding across the field of the microscope long before any other evidence of staining appears. As the staining fluid comes down further, the points increase in number, until finally, when the field of the microscope has been entirely traversed, they are countless. Under a magnifying power of twelve hundred diameters, they appear as minute, round bodies. Their small size renders a measurement of them difficult; but I have estimated their diameter at from 1-20,000 to 1-40,000 of an inch. They stain deeply with carmine, and are highly refractile, the stained ones appearing as bright red points surrounded by a black rim. The width of this rim varies as the focus is changed; when they are slightly beyond the focus, the red point disappears, and they show as black dots.

I have seen these bodies in the blood of every person which I have examined, with one exception. I studied the blood of Mr. Griscom during a long fast which he underwent in Chicago. For part of this fast these bodies were absent. During their absence I observed many granular white corpuscles of exceptionally large size. They seemed to be composed of sperules of about the same size as the granules before described. The corpuscles often had an active amœboid movement. At this time the granules flowed out into the

protruding portion in a kind of stream. Aside from this motion the granules were usually still. Occasionally, however, they had an independent motion, like the motions of the granules in the pus corpuscle before described. I have watched one of the granules move for a considerable distance through the corpuscle; the other granules at this time were vibrating uneasily like individual bees in a swarm. The corpuscle itself, with the exception of an almost imperceptible vibrating movement, remained still.

These corpuscles usually had one or more places destitute of granules, which resembled nuclei. The spots did not stain with carmine, and were unmistakable depressions. They seemed to me, therefore, to be places free from granules, rather than nuclei. Their floor showed a slightly uneven surface.

I studied these bodies for about two weeks, the time of the absence of the granules from the blood. After a time the granules began to return. At first they were of a low refractive index, and stained faintly; gradually they assumed their usual appearance.

About the time of the re-appearance of the granules, I noticed a change in the granular corpuscles. They stained more readily and more deeply with carmine than ever before; the places destitute of granules became larger and more numerous, and I began to see appearances as though granules were leaving them. On two occasions I saw bodies which presented all the appearances of the other granular corpuscles except that the nuclear-like space had enlarged to such an extent that the body was nearly destitute of granules. Many granules were seen in the act of passing out from the corpuscles, and many were seen near the corpuscles as though they had just left them.

The conclusion from these facts seems to me to be warranted, that the granular corpuscles, at least, are composed of minute round bodies held in a stroma, and that, possibly, they may be the source of the granules found in the blood.—*Dr. Lester Curtis in Proceedings of American Society of Microscopists.*

Society Proceedings.

THE regular meeting of the State Microscopical Society of Illinois was held at the Academy of Science, No. 263 Wabash Ave., on Friday evening Dec. 9th, 1881. President Dr. Lester Curtis in the chair, after the reading of minutes and other routine business the Secretary announced the following donations:

From Dr. Schmidt, of New Orleans, one dozen slides, consisting of nerve fibres and other histological preparations.

"Botanical notes" from Prof. E. J. Hill, of Englewood, Ill.

Bulletin of Microscopical Society of Belgium, and the report of the Microscopical Society of Liverpool.

Dr. Angier, of Ft. Madison, Iowa, spoke in reference to some acari which he had found under the skin of a chicken.

Prof. Burrill, of Champaign University was introduced and spoke in reference to the poison of the poison ivy. He took some of the excudation and found it teeming with bacteria and he questioned whether the poisoning and the bacteria came from the plant or otherwise. The speaker stated that upon examination of the washings of the leaves he found the same forms, the milky fluid which exuded from the stem contained numbers of them and the effect of placing some of this upon his arm had been attended with quite serious results.

The speaker went on to say that he had found the foregoing facts true with other plants among which he mentioned the chicory, buckwheat and dandelion.

Dr. Curtis described a new half inch objective made by Gunlack and owned by Dr. J. Hollite. The glass was claimed by the maker to have an angle of 100°. Its angle had not been measured since leaving his hands.

It has the society screw and can be used on any ordinary stand. The back lens of the objective is large and extends beyond the border of the opening in the screw. This opening therefore, acts as a diaphragm. In order to secure the benefit of the full aperature the portion of the objective can be removed and an adapter furnished with the Butterfield broad gauge screw can be substituted. It has also another screw of about the same diameter as the Butterfield screw, but provided with a finer

thread; the name and description of this crew was not known. The front of the objective is ground down to a conical shape. For ordinary use this front is covered with a brass cap, having an aperature on the centre to allow the conical end of the objective to pass through. The cap can be removed when it is described to use the objective for the examination of opaque objects. On removal of the cap the conical sides of the lens are seen to be covered with some sort of black varnish to prevent the passage of outside light. A lieberkuhn is furnished with the glass which can be screwed on in place of the cap while examining opaque objects. The speaker had not had the glass in his hands long enough to become perfectly acquainted with all its qualities; it certainly is a good one, however. It resolves angulatum very satisfactory and bears eye-pieces extremely well, working admirably on anatomical structures.

The lieberkuhn seems to be a valuable addition for some sorts of study as it brings out surface markings with unusal clearness, even in transparent objects. Mr. E. B. Stuart exhibited a Hitchcock lamp which he stated commended itself to the use of microscopists. No chimney is required, it being a blast lamp, the flame of which is fanned by a passage of air from the bottom to the top of the lamp, driven by a noiseless clockwork. The oil well is entirely separate from the outside part of the lamp, and is kept cool by the cold blast of air constantly surrounding it. It gives a light of about a six-foot gas burner and the flame is steady and more free from flicker than gas or the ordinary carbon burner. He also showed under the microscope specimens of the gelatin-bromide plate for photographic work, that had been submitted by a photographer as imperfect. An inspection under the microscope showed three kinds of spots. One, caused by dust particles which had settled on the gelatine while still soft, and as the emulsion hardened, became firmly fixed on the plate. The second kind of spots were caused by, apparently, the solvent action of some substance on the fibre as it could be seen to be less dense at those points, while the third were thicker and evidently caused by carelessly spattering the emulsion on partially dried plates.

The meeting was then declared informal.

Wm. Hoskins, Secretary.

Reviews.

A Manual of Practical Normal Histology. By T. Mitchell Prudden, M. D., Lecturer on Histology in Yale College, etc., pp. 165; 12mo. G. P. Putnams' Sons, New York City, 1881.

This work is so arranged that a course of 40 lessons of about two hours each will embrace the substance of the book. It is not designed to take the place of the more elaborate treatises on this subject, but rather to give brief descriptions of tissues and organs and the way by which they may be demonstrated. The subject matter is correct, and the laboratory methods excellent. A useful hand-book for the student and practitioner.

The Brain of the Cat. Burt G. Wilder, M, D., Professor of Comparative Anatomy, etc., Illustrated with four lithographic plates; figs. 20; pp. 50; 8vo.

This paper is the first of a series of contributions to the knowledge of the brain of the domestic cat.—[Author's introduction.] Reasons are assigned for employing the cat as an introduction to the study of other forms. The value of the brain in determining taxonomic relations is well established; but vagueness of information restricts the practical application of this character in fixing zoölogical affinities. The toponomic terms, while effecting somewhat of a revolution in anatomical nomenclature, give perspicuity and exactness to the subject matter.

Every student of anatomy should acquaint himself with this work for its nomenclature, synonyms, method of treatment of subject, as well as for the scientific information contained.

The plates are highly creditable to the artist, and thoroughly illustrate the text.

The Journal of the Royal Microscopical Society for December.

This journal is as full of information as usual, and one is surprised how so much knowledge can be collected from so many sources.

Journal de Micrographic. Publié e sous la direction Dr. J. Pelletan, Paris.

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A Brief Synopsis of Some of the Lectures on Anatomy. By Professor C. L. Ford, Professor of Anatomy and Physiology, University of Michigan.

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Annual Address Before the Bridgeport Scientific Society. By President H. N. Powers, D. D., pp. 11; 8vo.

Atlantic City as a Winter Health Resort. By Boardman Reed, M. D.; pp. 22; 8vo. Philadelphia, Pa.

The Chemical Elements. By G. G. Groff, M. D., Professor in the University at Lewisburg, Pa. Second edition. Revised and enlarged.

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Proceedings of the American Society of Microscopists. See editorial.

Forty-Fourth Annual Report of Superintendent of Public Instruction of the State of Michigan. Hon. C. A. Gowen, Superintendent.

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INDEX FOR VOL. I.

PAGES

Adulterations of Bread and Milk. 124
Butter..... 118
Coffee..... 89
Drugs..... 45
Food.....120–122
Ipecacuanha, illus. 1
Milk..... 96-124
Sugar..... 60
Vinegar.....61–91
Anatomy, Use of the Microscope in. Illustrated..... 65
Apocynum Androsæmifolium, Illustrated..... 181
Apocynum Cannabium. Illus... 180
Bacteria, Fallacy of..... 85
Bacteria, Immortality of..... 120
Barley Flour..... 119
Bone, Cartilage to..... 72
Blood, Desiccated. Illustrated.. 103
Diagnosis of Diseases of. 93
Filaria in..... 118
Microscopical Examinat'n 59
A Study of..... 187
Bread and Milk, Adulteration of. 124
Brownian Movements 60
Butter Adulterated..... 118
vs. Oleomargarine..... 84
Carbolic Acid, Action of.....
Cartilage to Bone..... 72
Cells, How to color Living..... 117
Shellac..... 42
Chamber, Moist..... 119
Charbon and the Germ Theory. 51
Chicory for Coffee... 21
Ciliated Cells and White Blood-Corpuscles 26
Citric Acid for Impure Water... 49
Coffee, Adulterations of..... 89

PAGES

Contributions..... 17
Copal Varnish 117
Covers, How to Handle Thin... 96
Dentistry, Ancient..... 79
Diabetes Millitus..... 23
Diarrhœa, Infantile..... 22
Diphtheria..... 21
Drug Adulterations..... 43
Dysmenorrhœa, Membranous...7–23
Editorial Briefs.....118–179
Editorials 45–46–47–175
Encouraging letter..... 17
Fibres, Commercial. Illustrated.. 38
Flour, Barley..... 119
Potato..... 61
Food, Adulteration of.....120–122
Poisonous Articles of..... 181
Germ Theory and Charbon..... 51
Glucose, How to Detect..... . 59
"Gray Beard," Letter from..... 100
Hardening, Methods of..... 50
Hitchcock, Reply to R..... 148
Ipecacuanha, its Structure and Adulterations. Illustrated..... 1
Items 30–55–87–115–157
Jamaica Dogwood. Illustrated.. 80
Laboratory Notes. Illustrated..98–172
Membranous Dysmenorrhœa. Illustrated.....7–23
Mercury Absorbed from the Skin 19
Methods of Hardening..... 50
Micrococi and Grains of Silica... 53
Microscope, Claims of the..... 109
in Diseases of the Skin 33–75–76
"The Ideal"..... 150
Use in Anatomy. Illustrated..... 65

PAGES

Microscopic Revelations..... 58
Tests for Poisons.... 22
Microscop'l examinat'n of Blood 59
Microscopists, American Society 175
Milk, Adulterations of Bread &.90-124
Dangers of..... 90
Mounting, Hints on, (illus).97–134–161
the Starches..... 13

Neuralgia..... 20
New Discovery..... 113

Oleomargarine..... 90
vs. Butter..... 84
Oxaluria, A Case of. Illustrated 11

Pampas Grass..... 49
Paris, Letter from..... 74
Phosphates, The Urinary. Illus. 68
Poisons, Microscopic Tests of... 22
Poisonous Articles of Food..... 121
Potato Flour..... 61
Prizes..... 43
Proceedings of Ill. State Microscopical Society..... 159–194
Prospectus..... 177
Protococcus plunalis..... 42

Revelations, Microscopic..... 58
Reply to R. Hitchcock..... 148
Reviews:
Accidents and Emergencies..... 94
Anatomy, Lectures on. 197
Bacteria..... 128
Brain of Cat..... 196
Catalogue of Phænogamous and Vascular Cryptogamous plants 128
Cranial Nerves..... 128
Histology of Locust and Cricket..... 95
Manual of Histology 127-196
Michigan State Board of Health..... 160
Michigan State Medical Society..... 160
Michigan University Book..... 63
Microscope and its Revelations..... 126

PAGES

Microscope, How to see with the..... 63
Microscop'l Technology 32
Observations with the Hæmacytometer..... 160
Teaching the Latin Language..... 160
The Human Body....63–94
The New Botany..... 160
Trichinæ..... 128
Urinary Analysis, Hand Book of..... 94
Rulings, fine..... 92
finest..... 158

Sanguis Bovinus Exsiccatus..... 48
Sciatica..... 54
Sections, Bleaching and Washing 123
Septic Poisoning from Vaccine Virus..... 20
Shellac Cells..... 42
Signatures, Examinations of.... 88
Silica and Micrococi, grains of.. 53
Skin, Mercury Absorbed from the 19
Skin, The Microscope in Diseases of the.....33–75–76
Sodium, Ethylate of..... 49
Spencer, Chas. A. Illustrated.. 129
Engraving of 150
Starch Grains, Development of.. 143
Starches, How to Mount the.... 13
Sugar, Adulterated..... 60

Tetanus, Hot Water in..... 49
There is not much in it..... 24
Thin glass-covers..... 31
Tonsillitis..... 48
Tichinæ? Does Cooking Destroy 47
Typhoid Fever..... 19
Specific Agent... 54

Urinary Phosphates. Illustrated. 68

Varnish, Copal..... 117
Vinegar Adulterations.....61-91

Whooping-cough..... 48
Cause of..... 31

Yellow Fever, Origin of..... 117

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ASSISTANT IN MICROSCOPICAL BOTANY, UNIVERSITY OF MICHIGAN.

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CONTENTS.

ORIGINAL COMMUNICATIONS.

PAGES.

Ipecacuanha, Its Structure and Adulterations. Illustrated. By Louisa Reed Stowell... 1
Membranous Dysmenorrhœa. Illustrated. By Mrs. B. A. Owens, M. D. 7
A Case of Oxalura. Illustrated. By E. O. Bennett, M. D... 11
How to Mount the Starches..... ... 13

EDITORIAL DEPARTMENT.

"No Room for Another Journal." ... 14
Contributions..... 17
Encouraging Letter..... 17
Our Next Issue..... 18

EDITORIAL ABSTRACTS.

Is Mercury Absorbed from the Skin ? 19
Typhoid Fever..... 19
Neuralgia..... 20
Septic Poisoning from Vaccine Virus. 20
Diphtheria... 21
Sale of Chicory for Coffee..... 21
Microscopic Tests for Poisons..... 22
Infantile Diarrhœa..... 22
Membranous Dysmenorrhœa..... ... 23
Diabetes Mellitus 23

SELECTIONS.

"There is not Much in it."..... 24
Action of Carbolic Acid upon Ciliated Cells and White Blood-Corpuscles.. 26

ITEMS. 30

REVIEWS. 32

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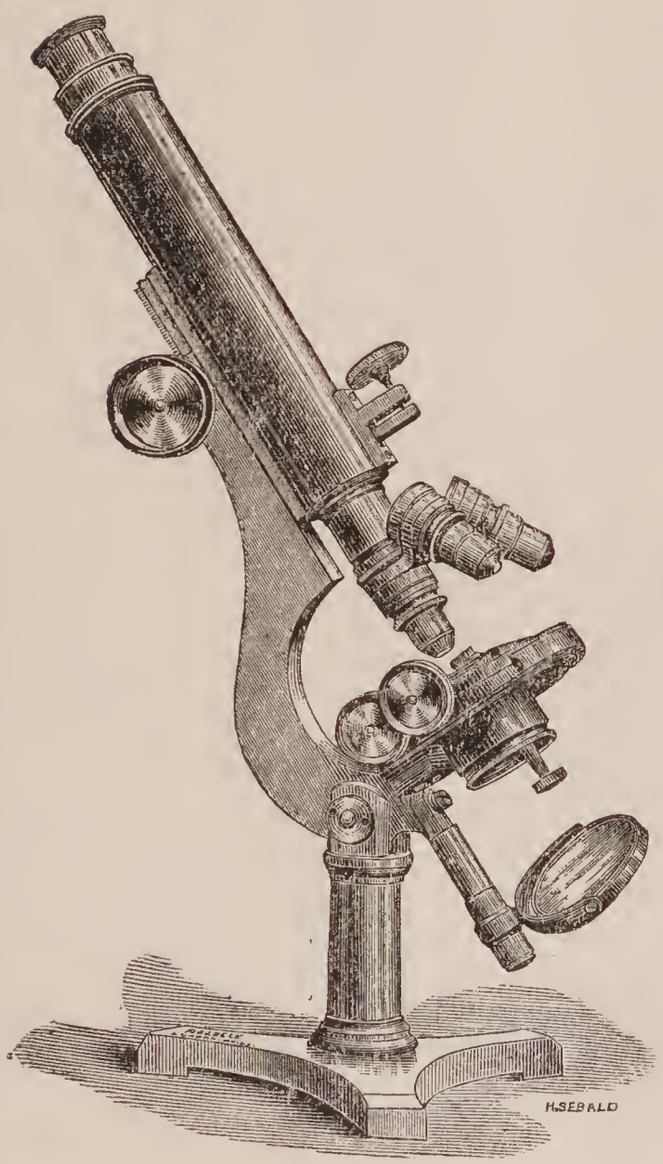

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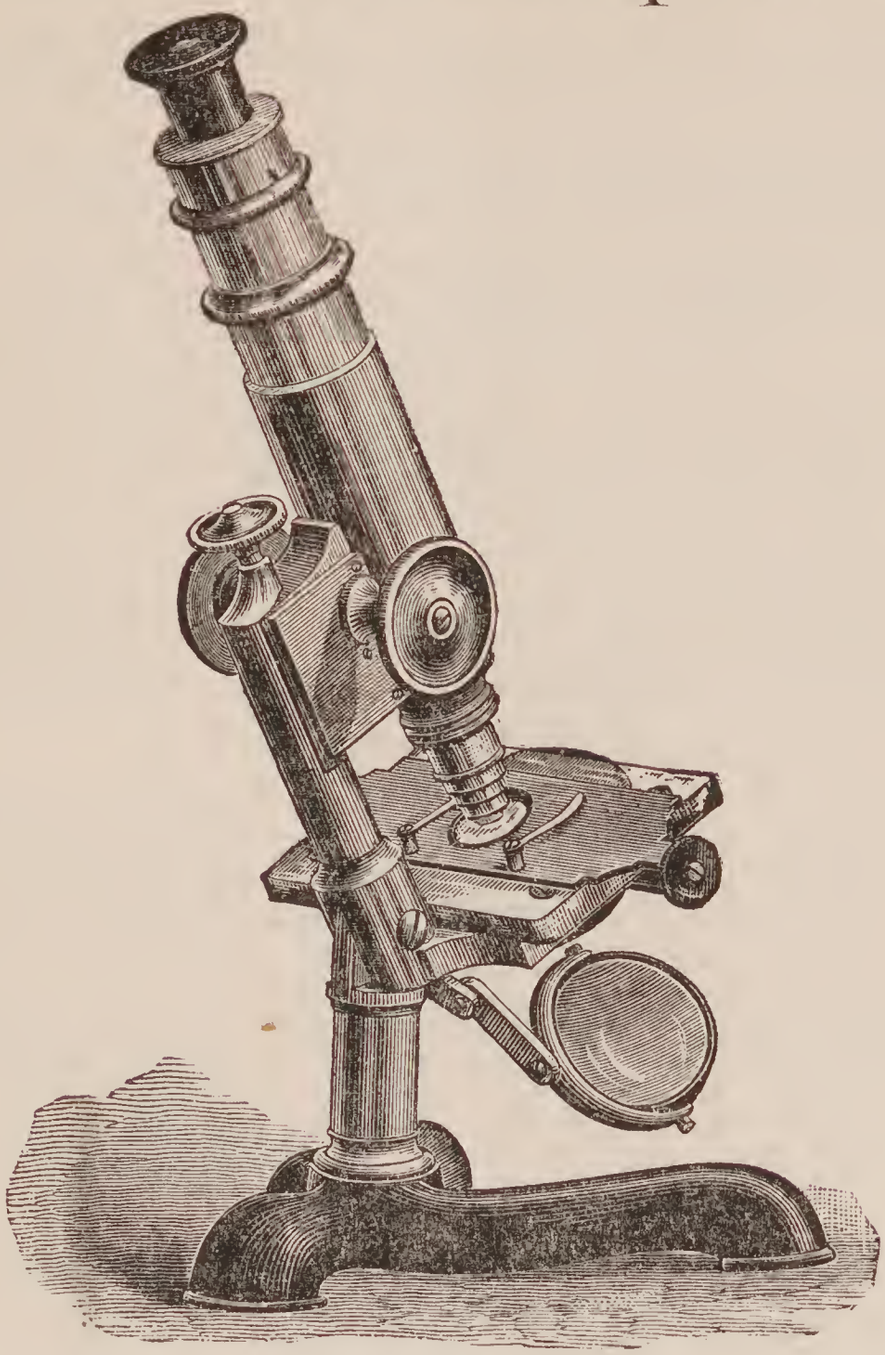

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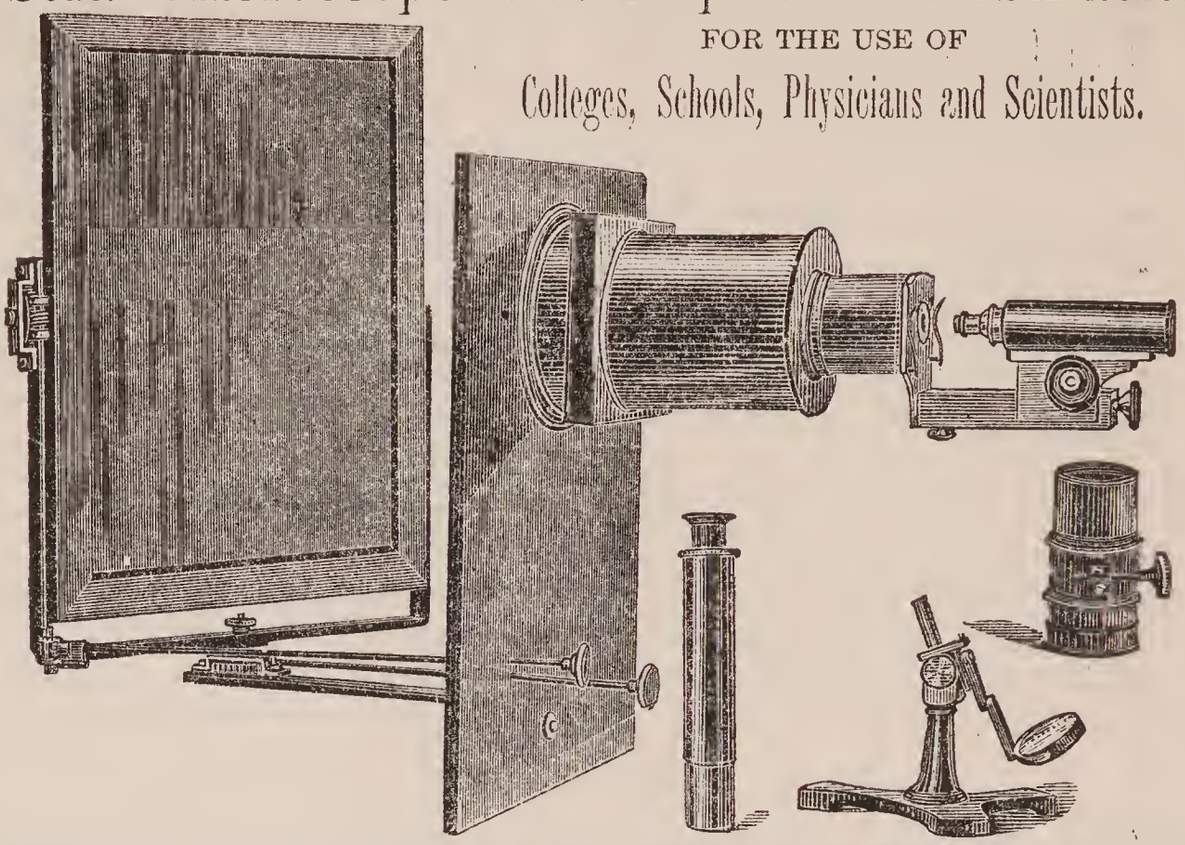

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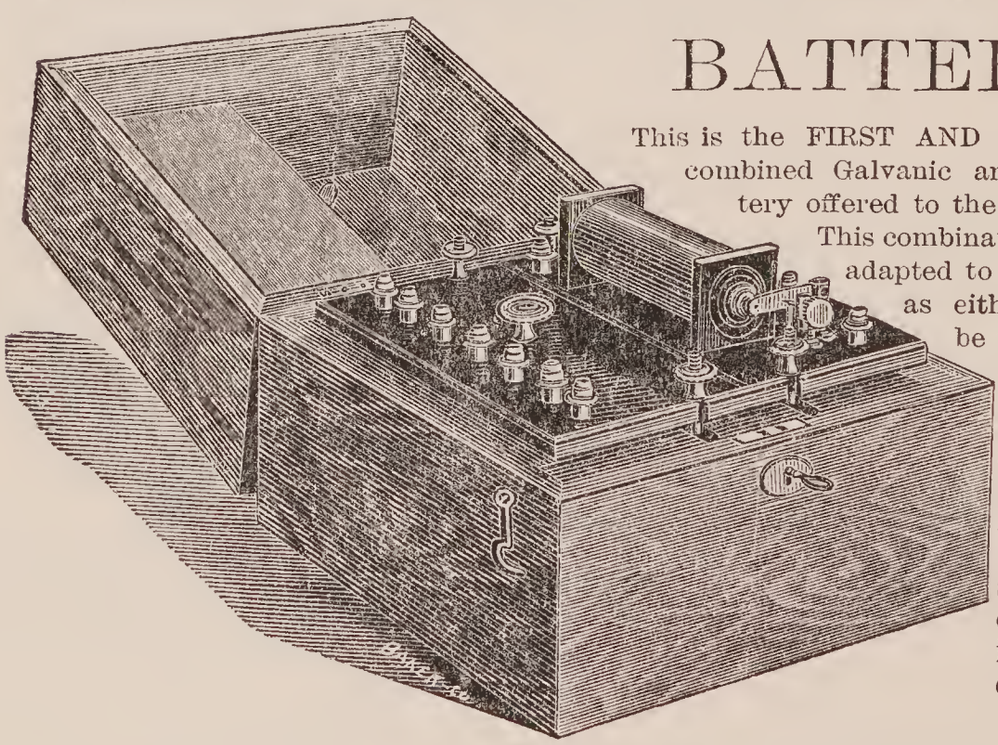

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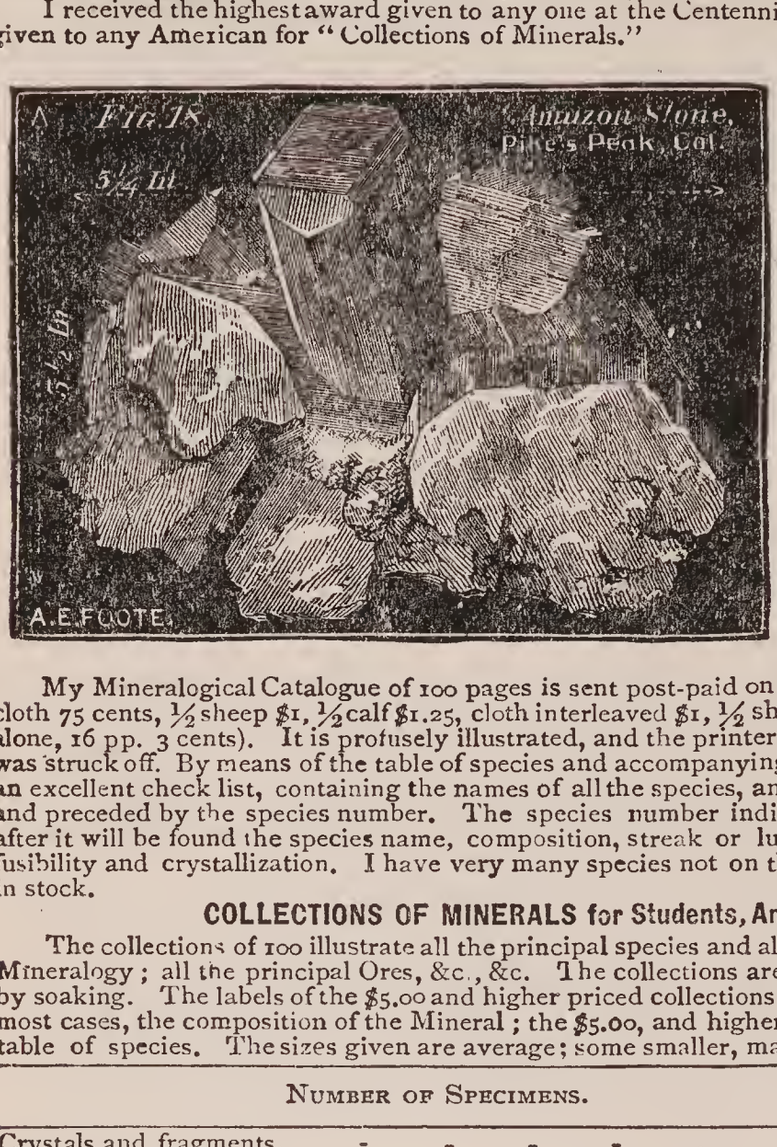

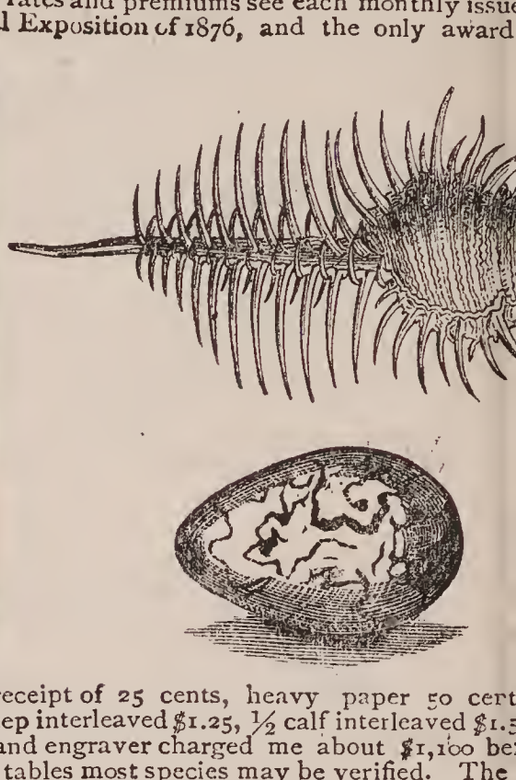

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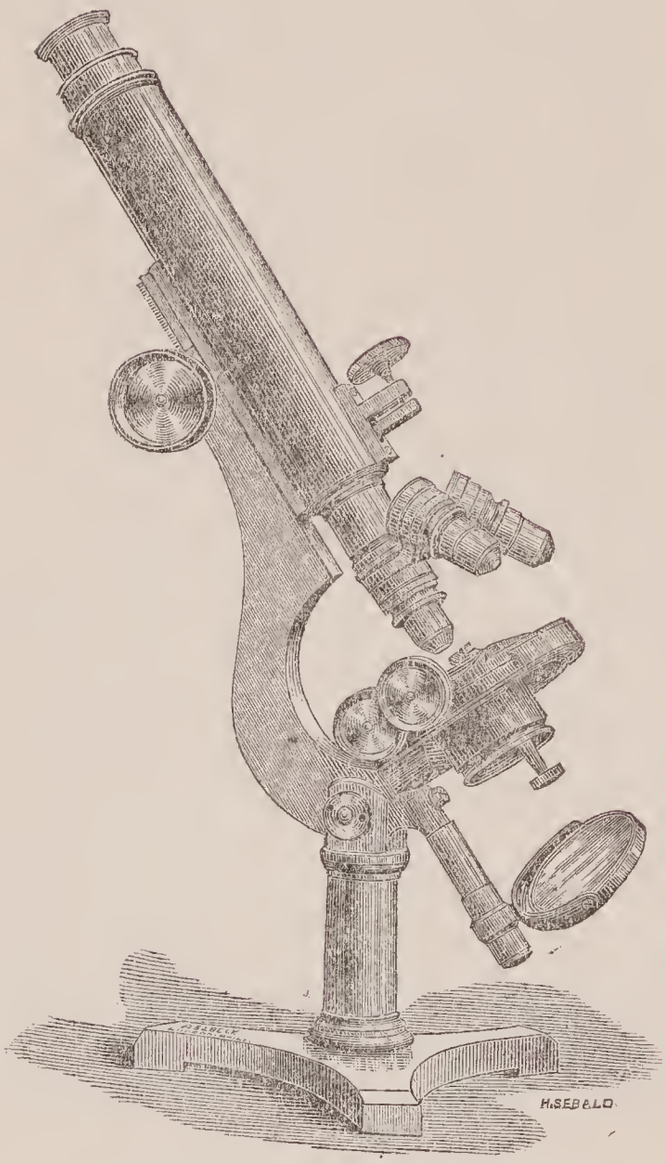

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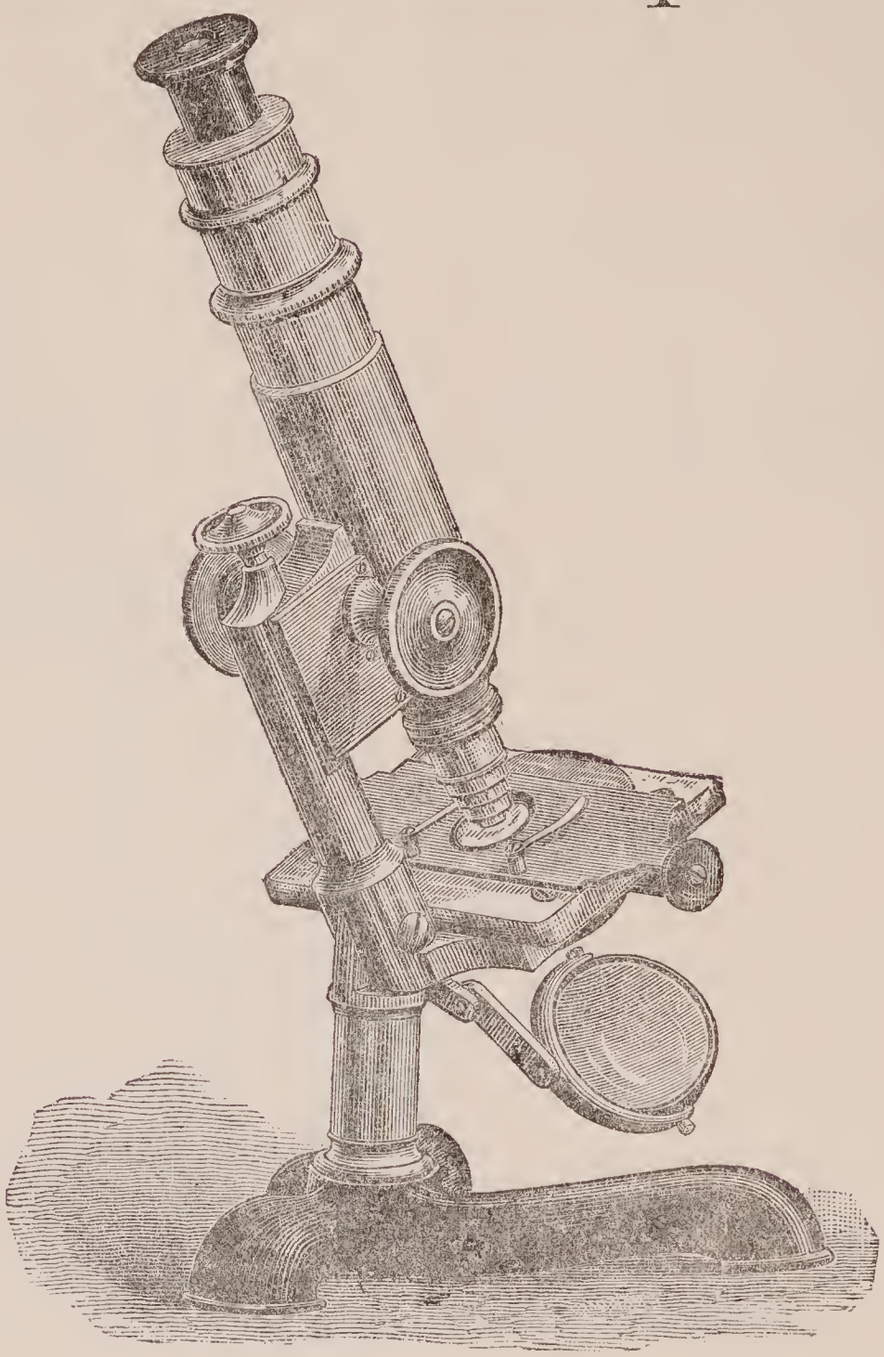

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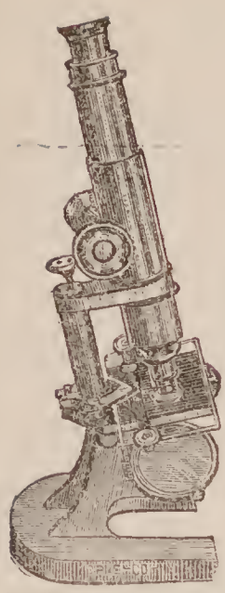

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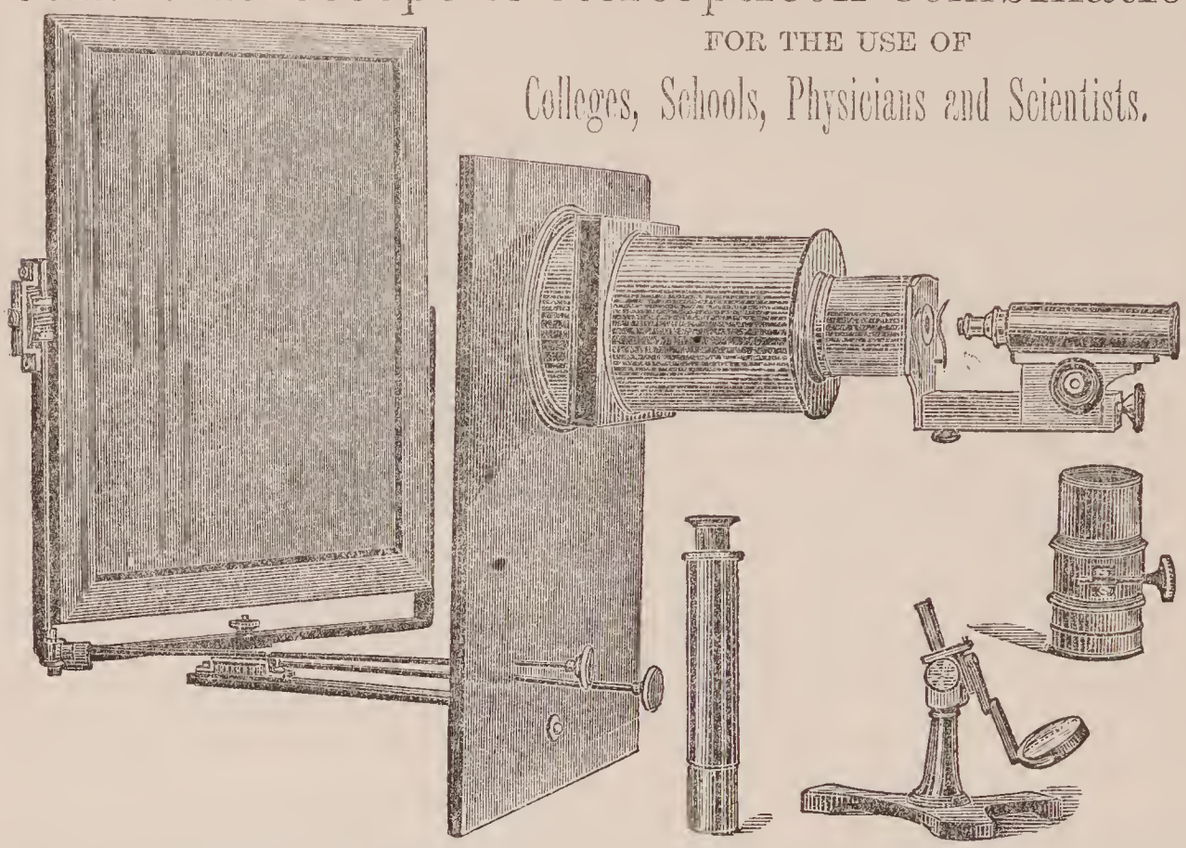

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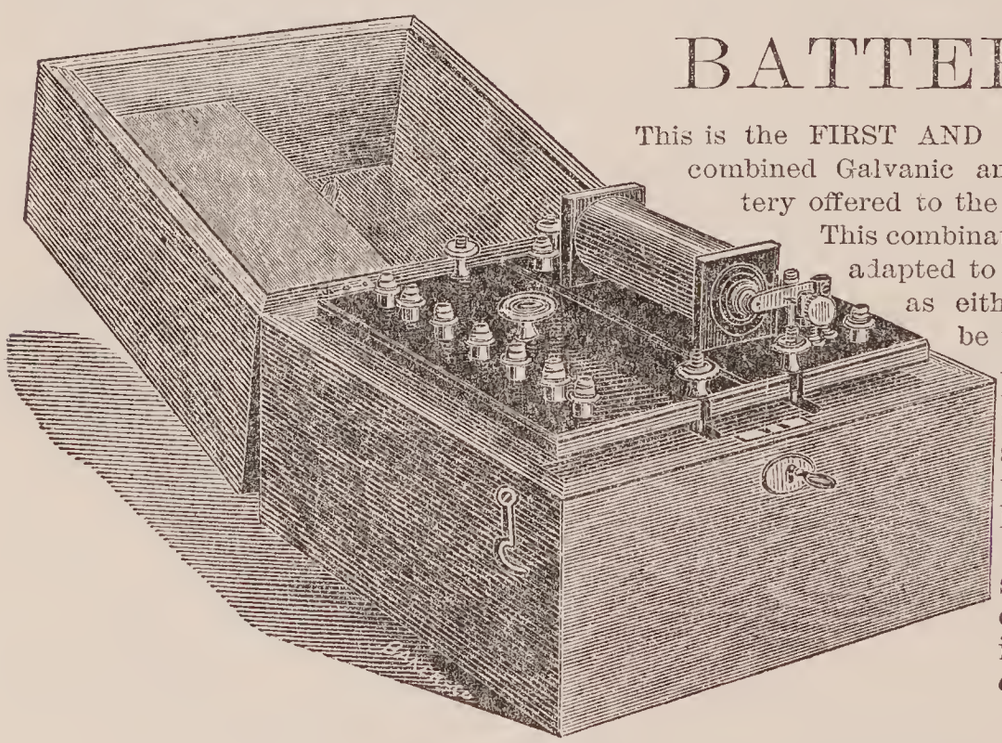

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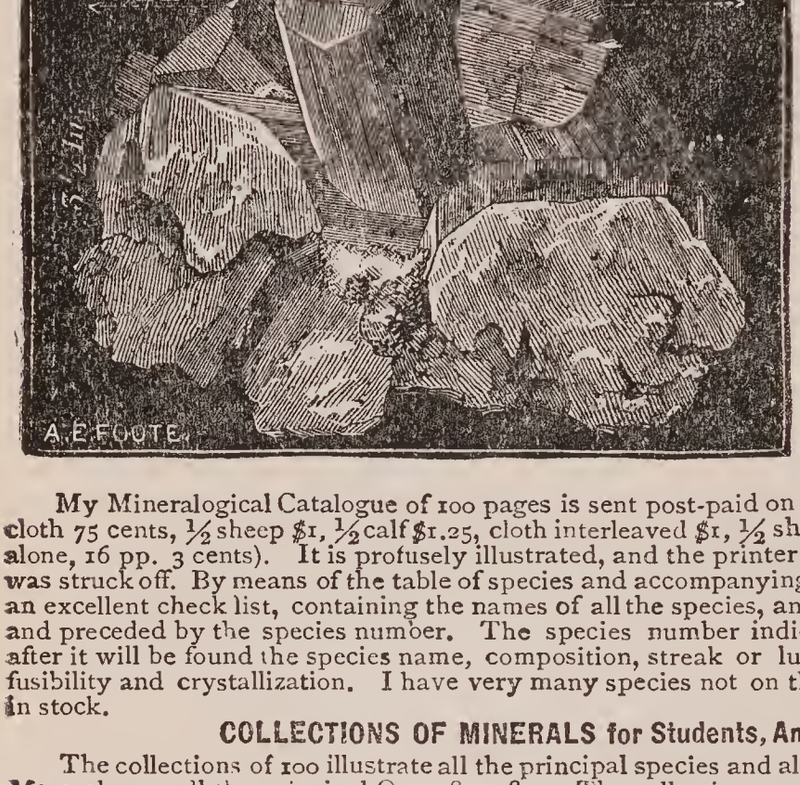

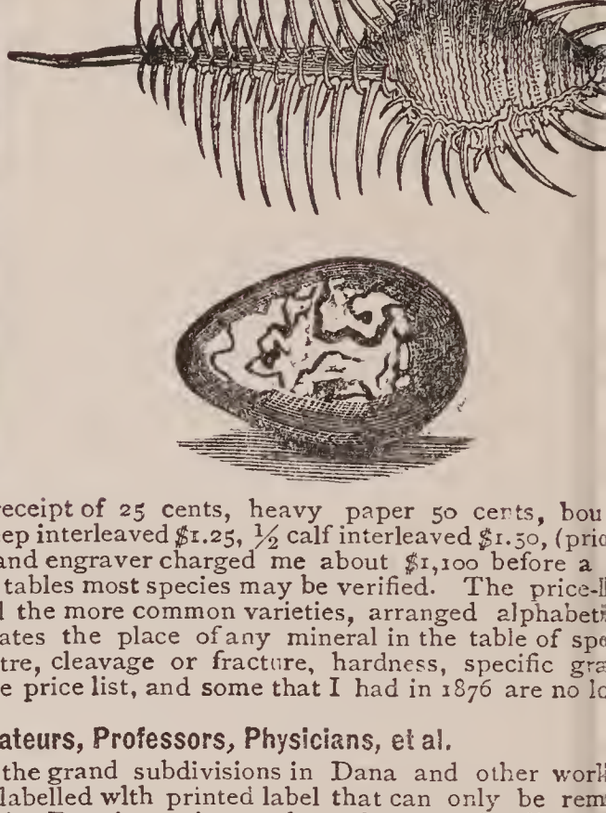

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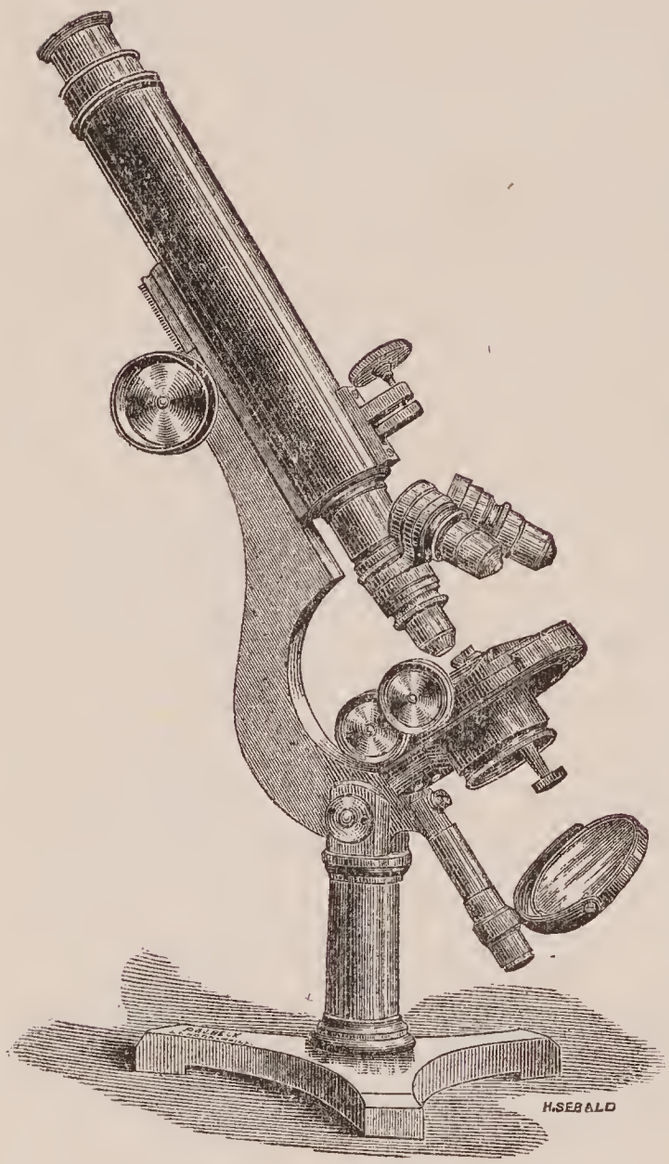

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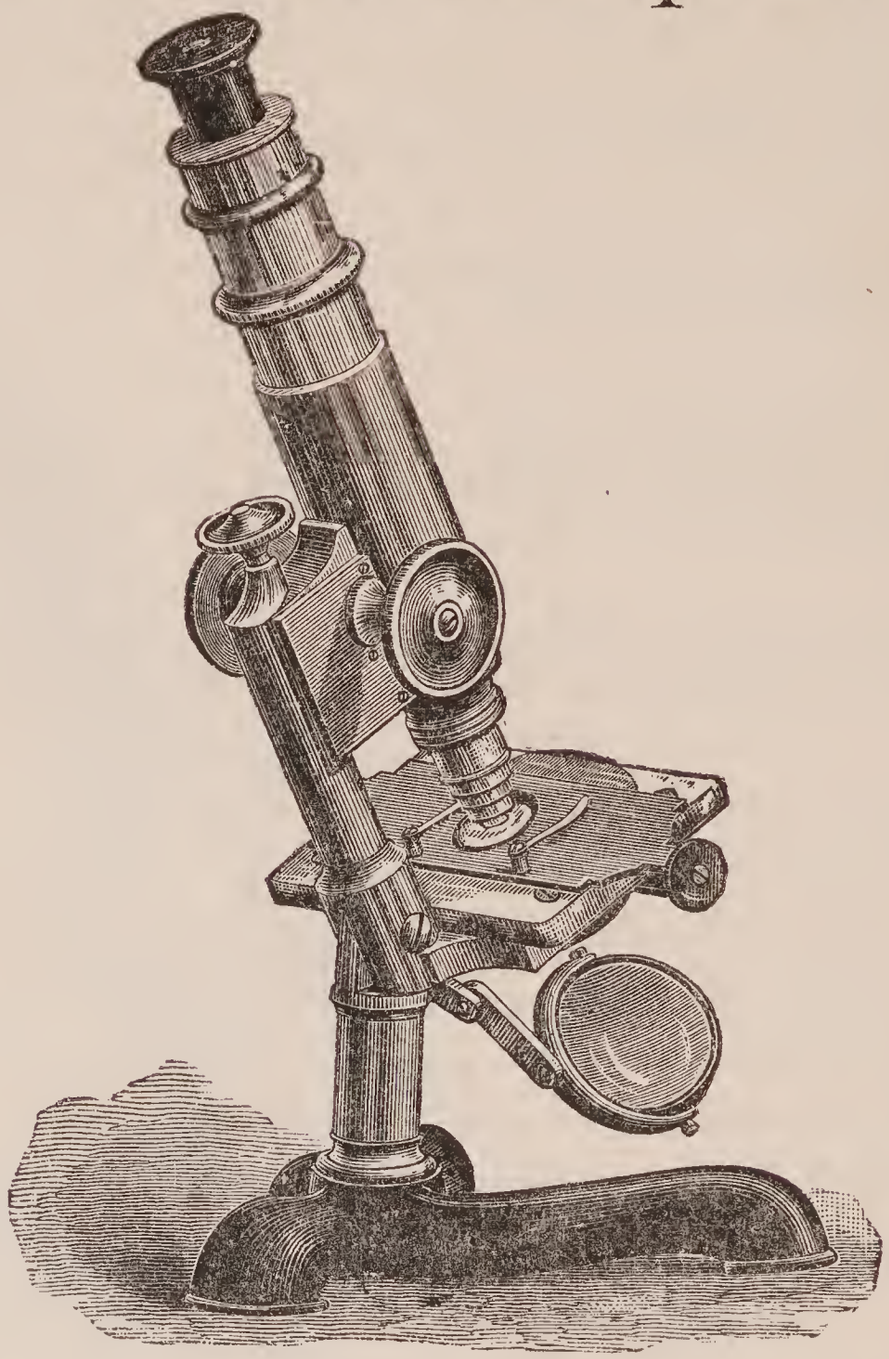

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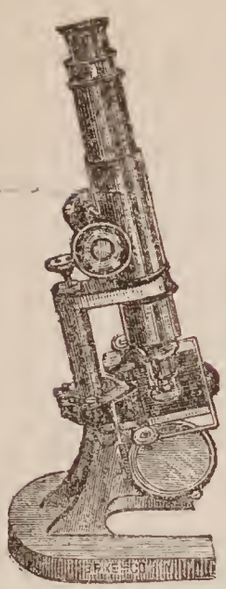

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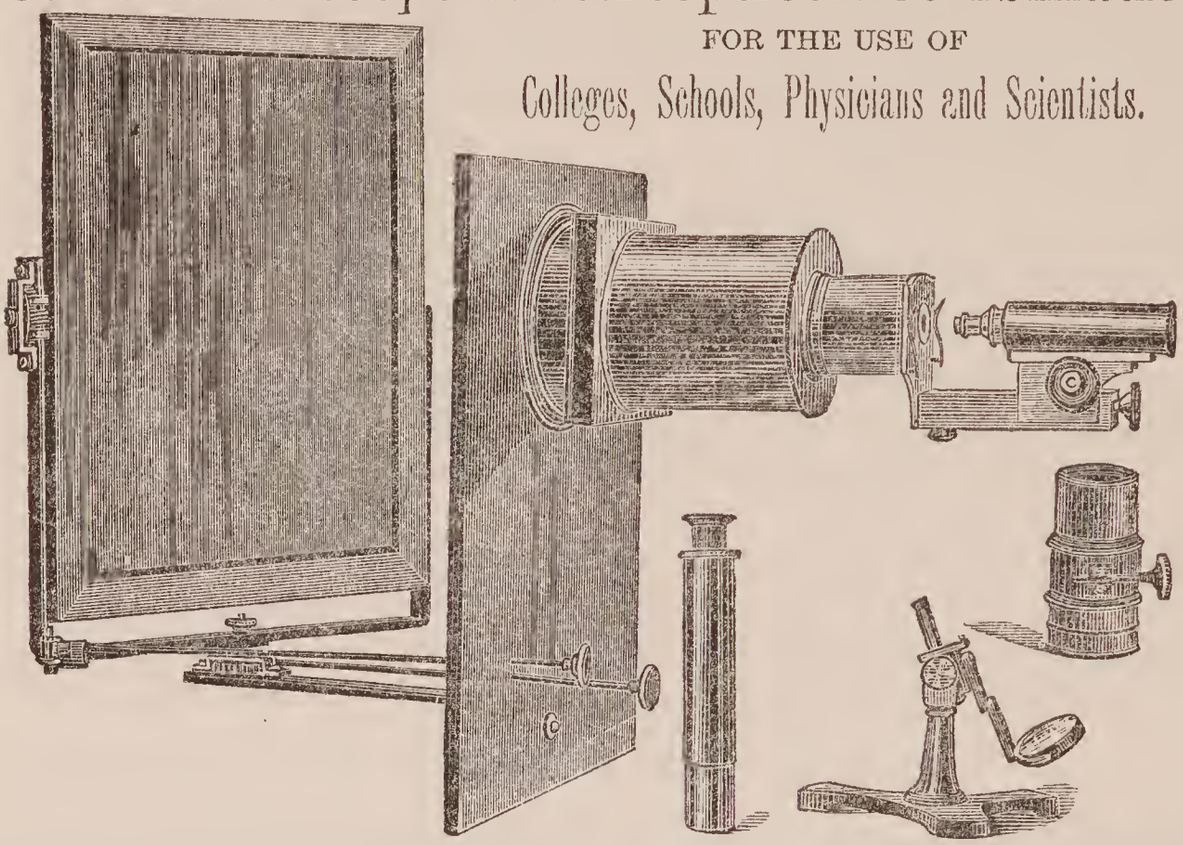

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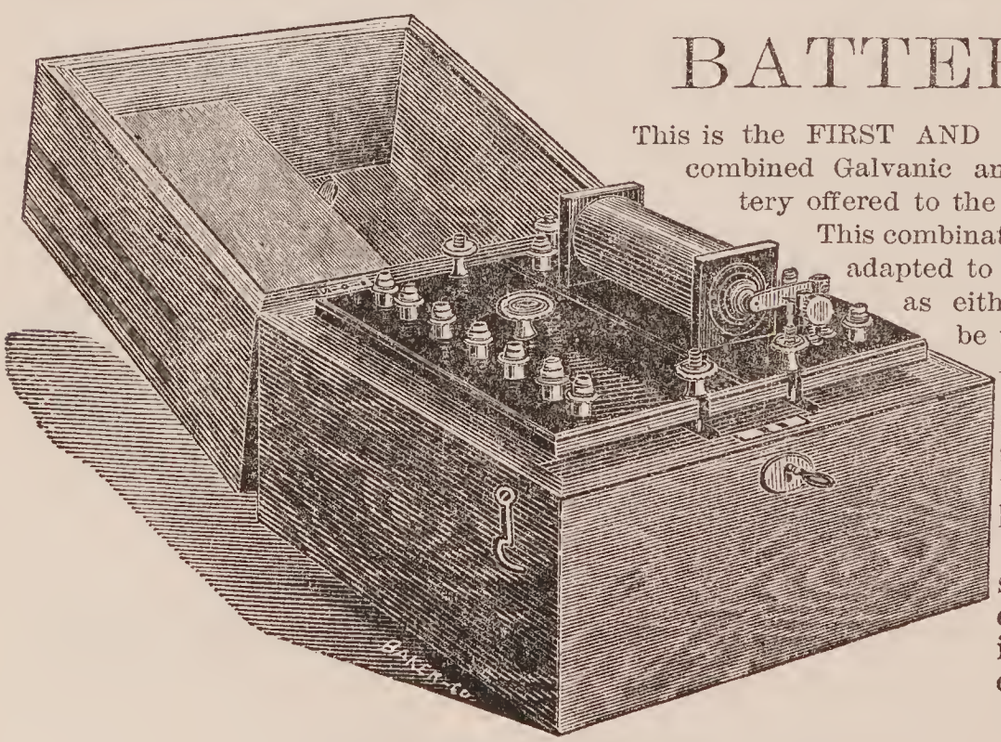

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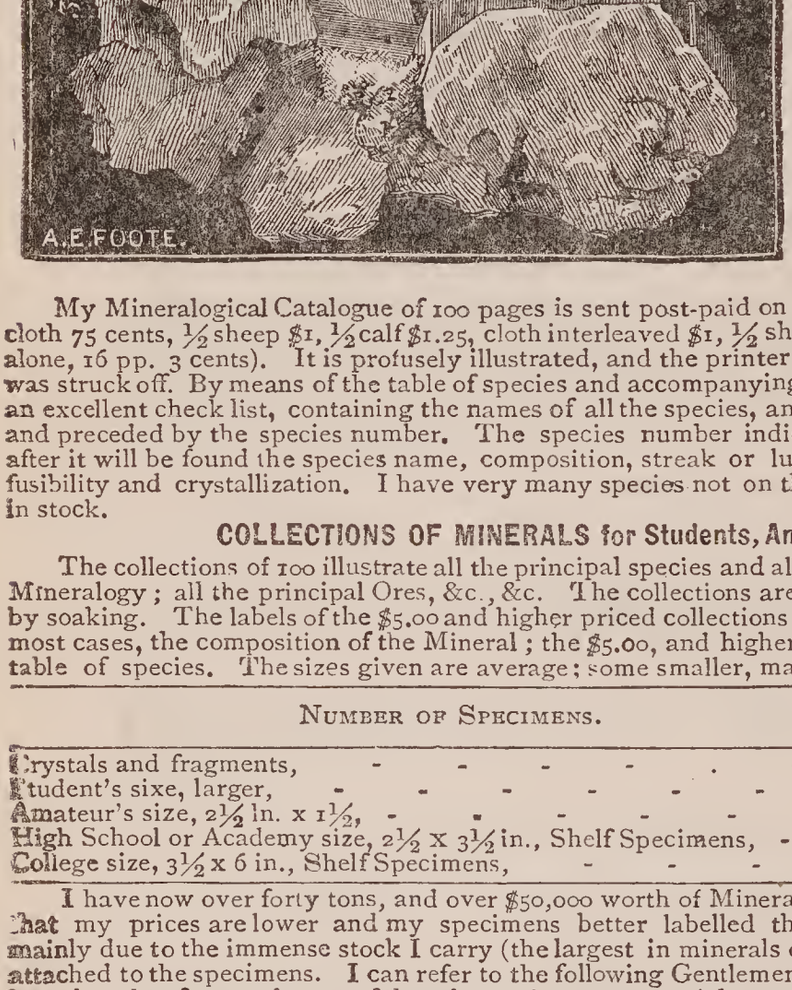

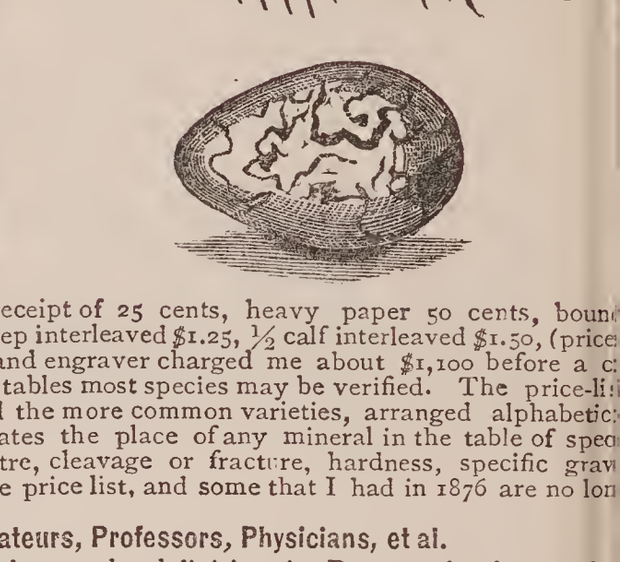

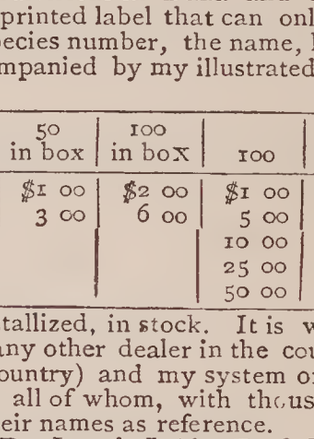

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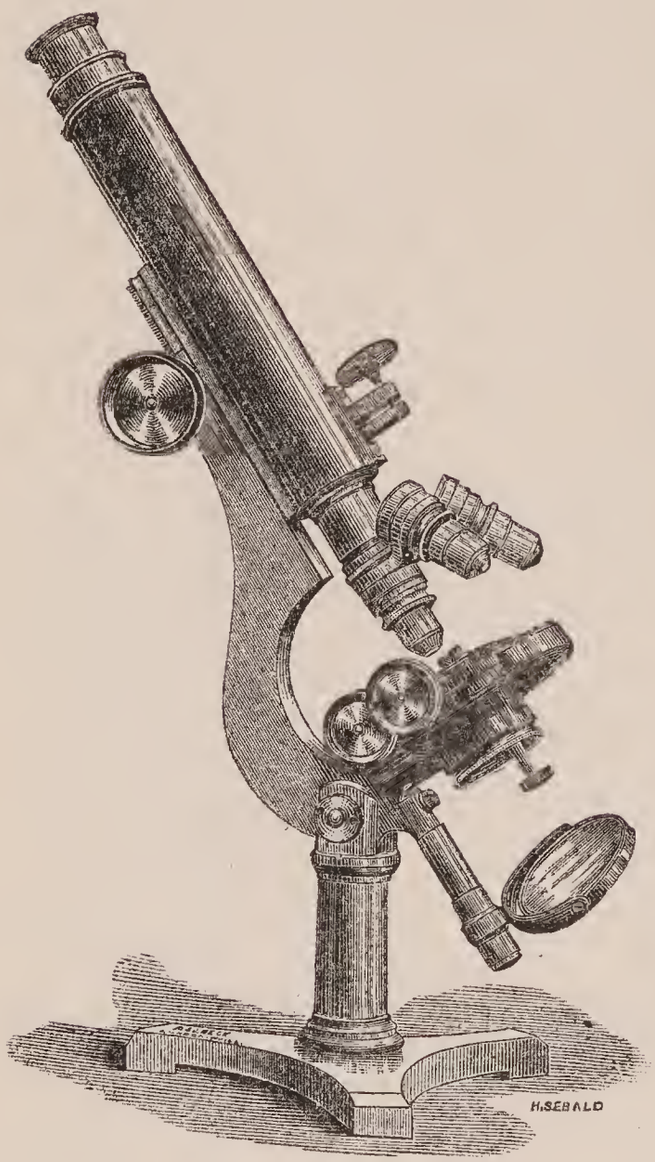

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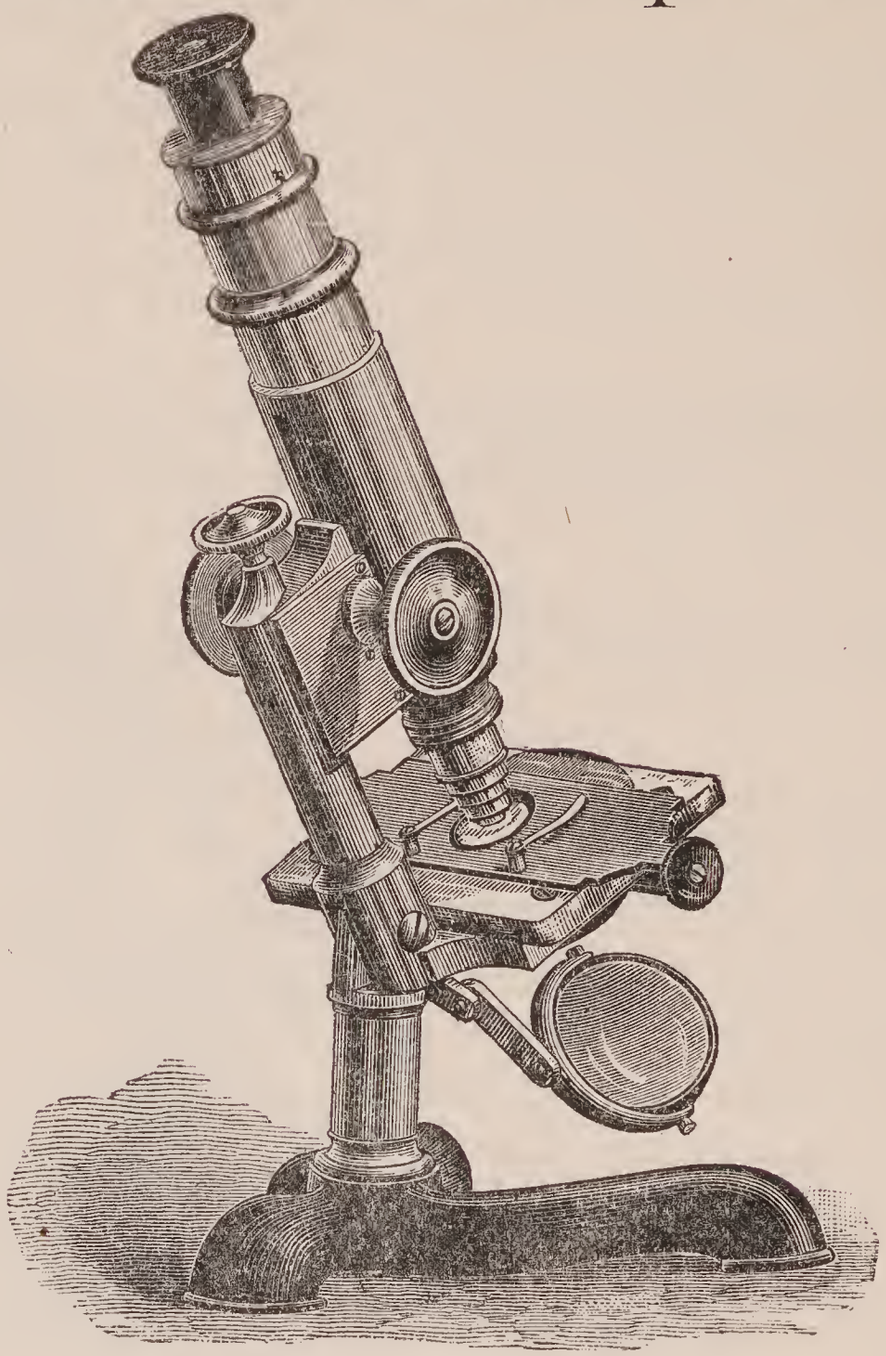

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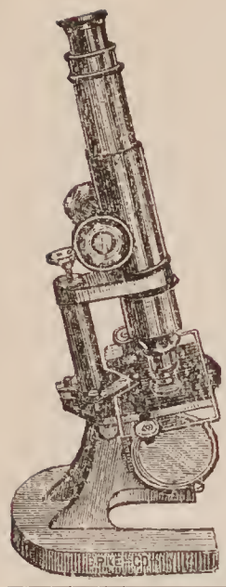

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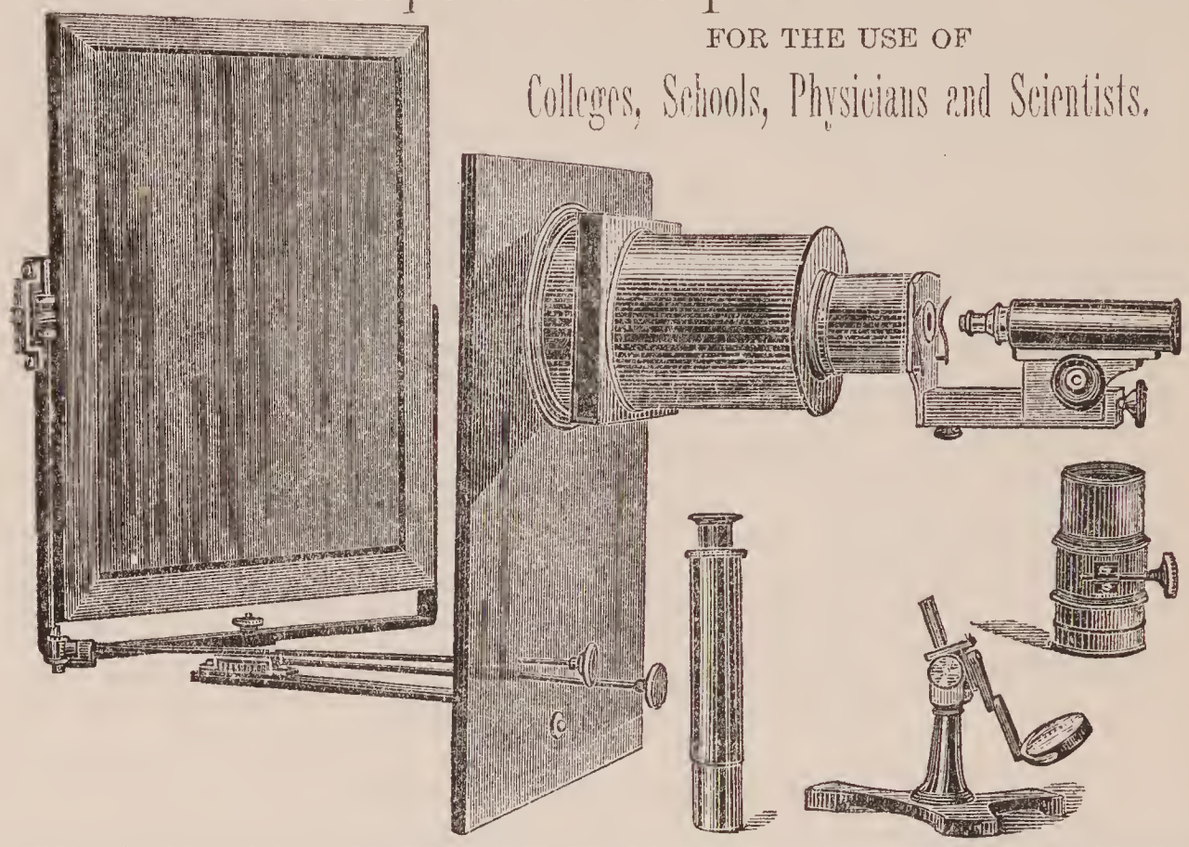

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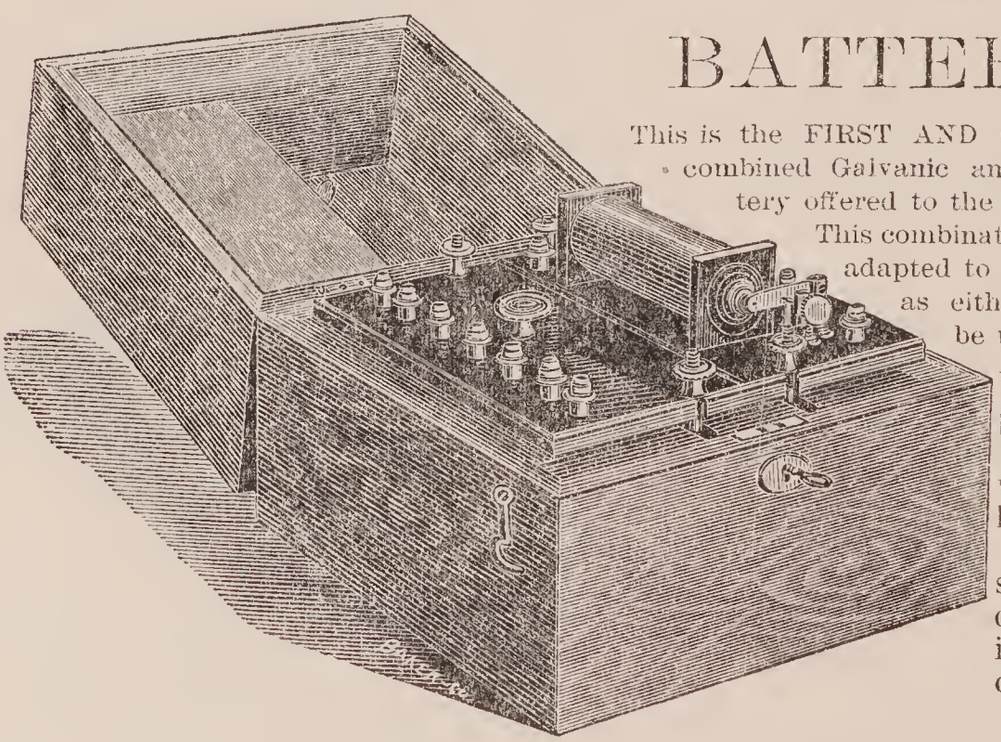

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[Advertising page XVIII.]

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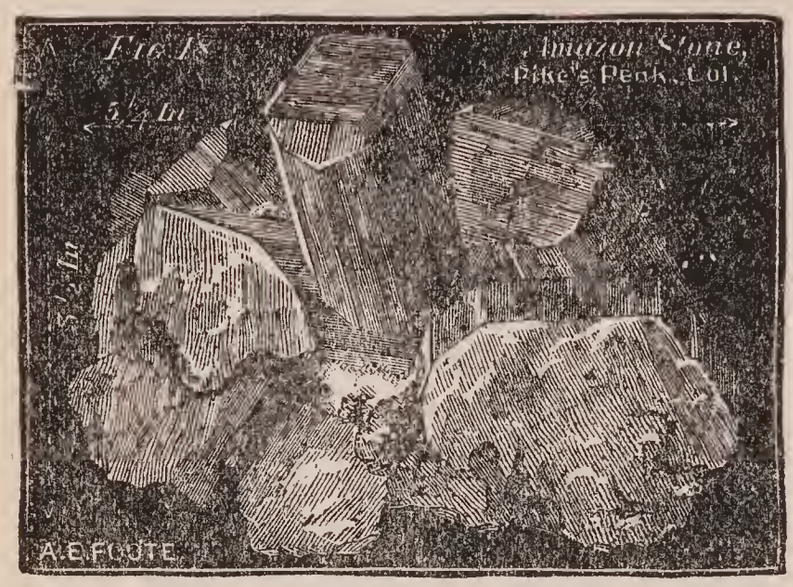

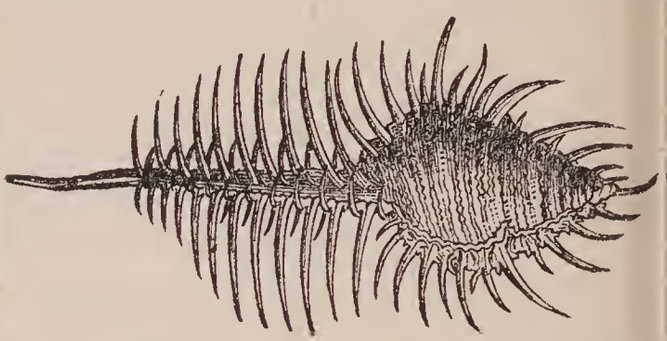

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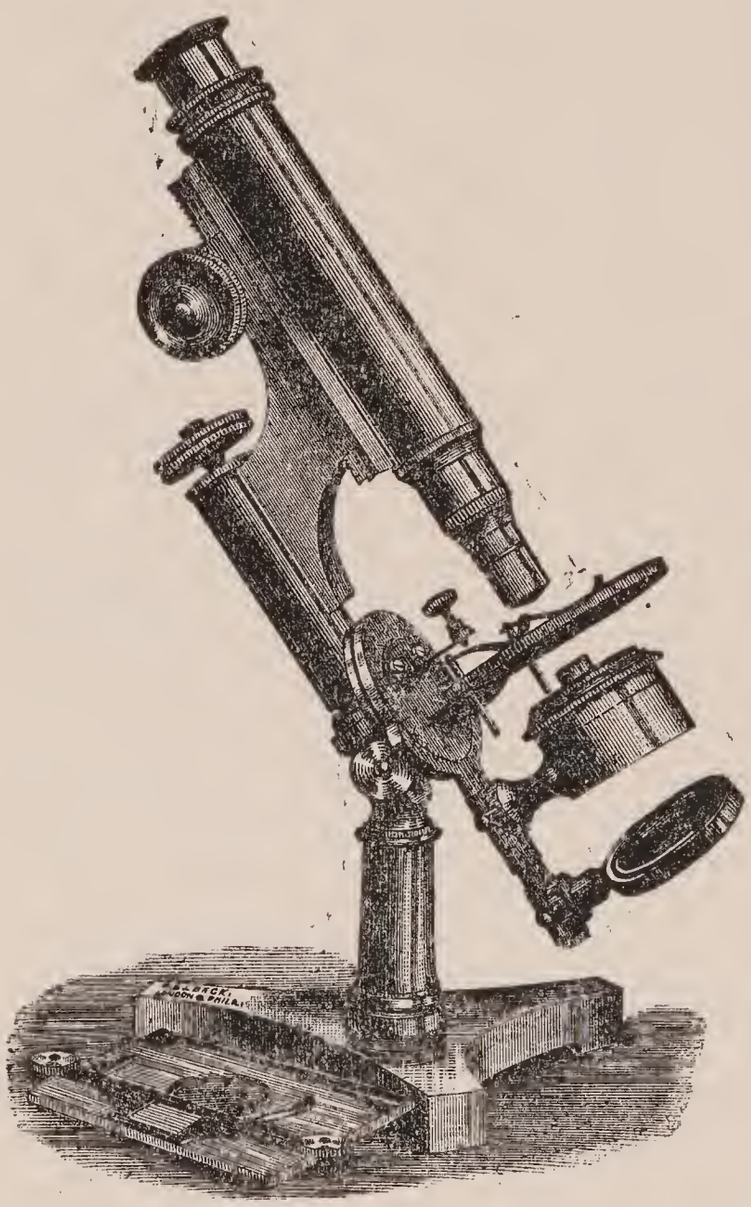

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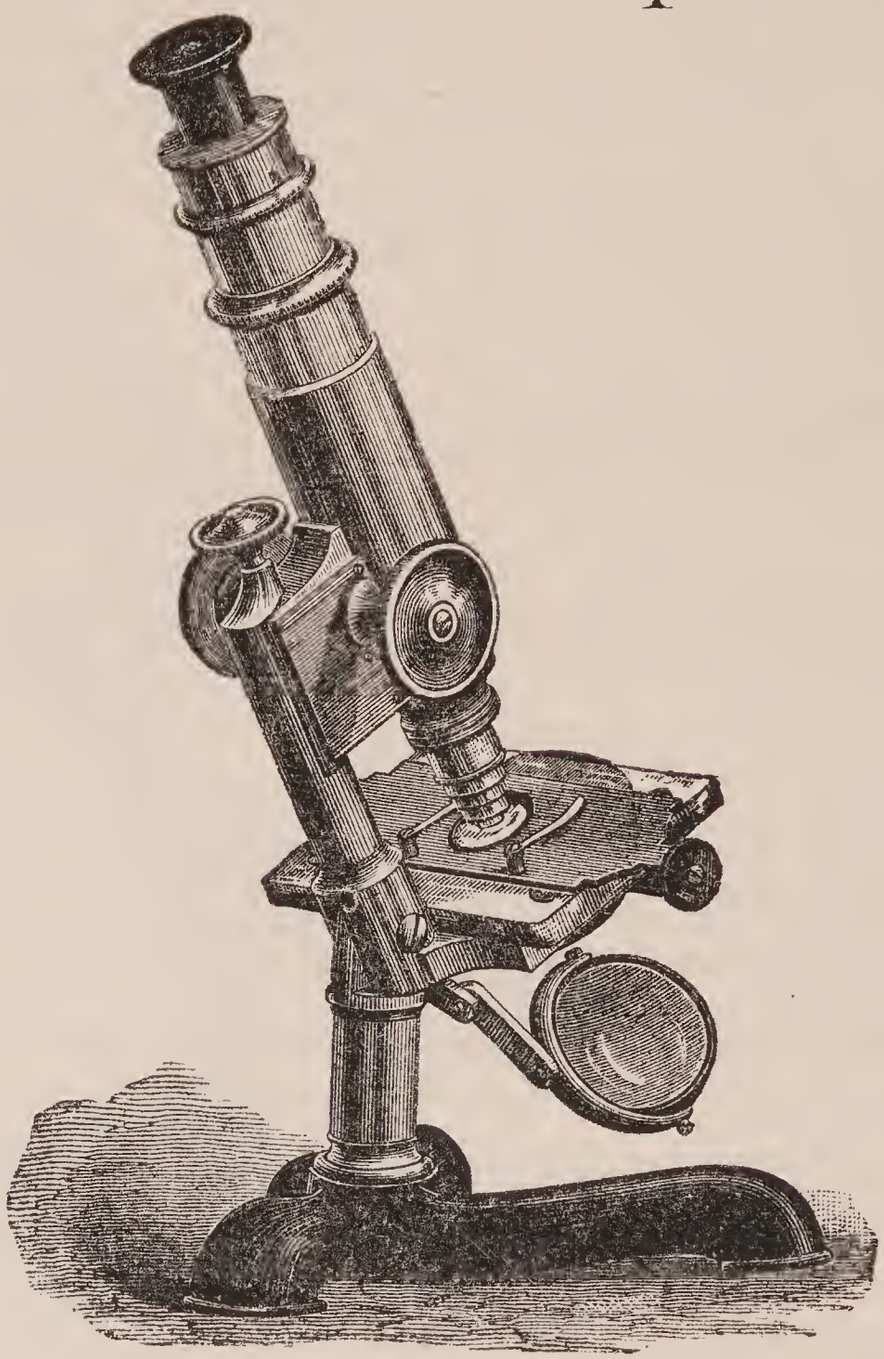

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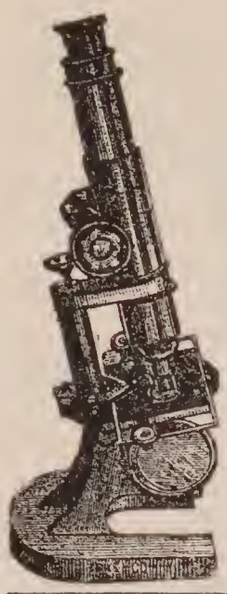

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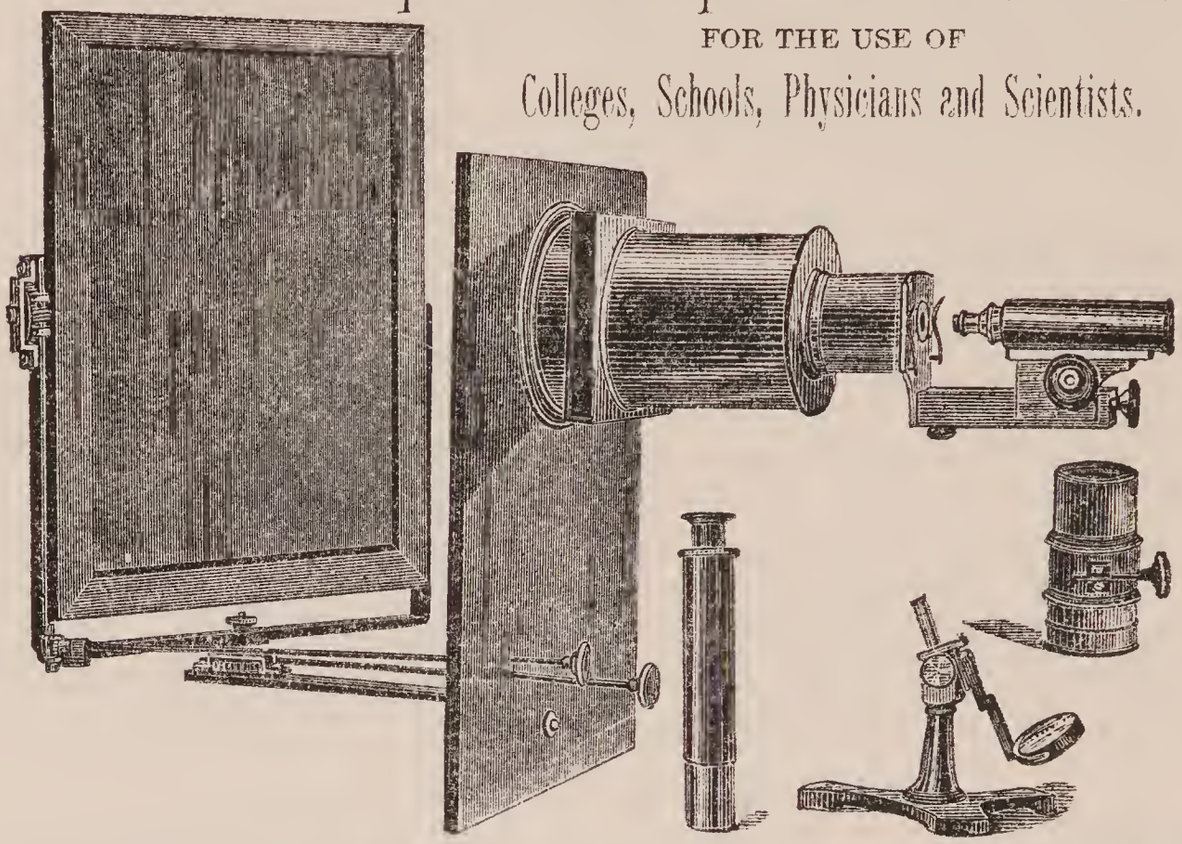

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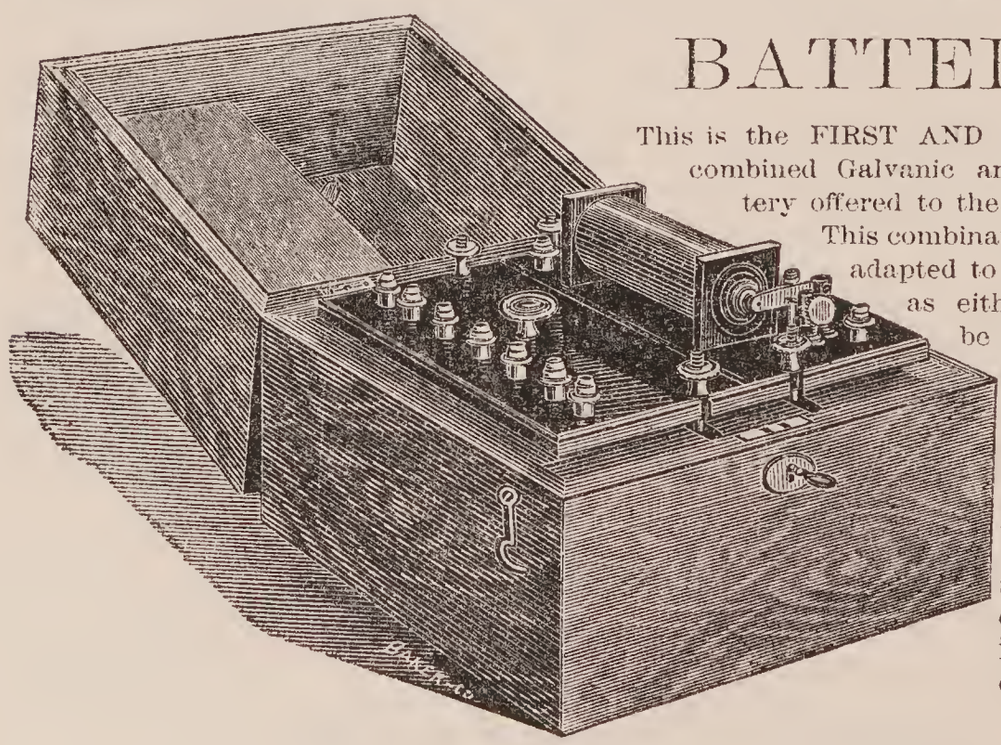

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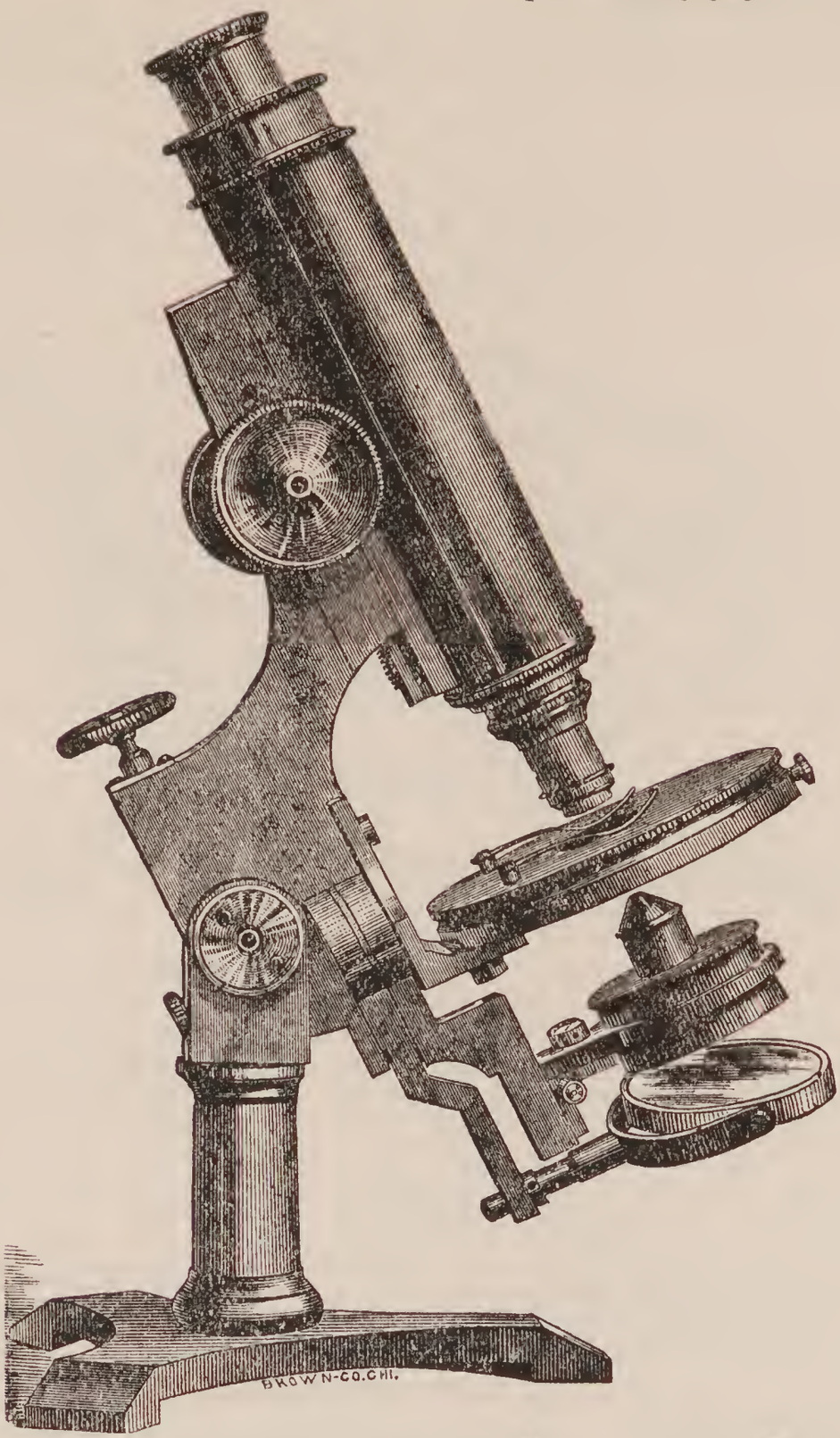

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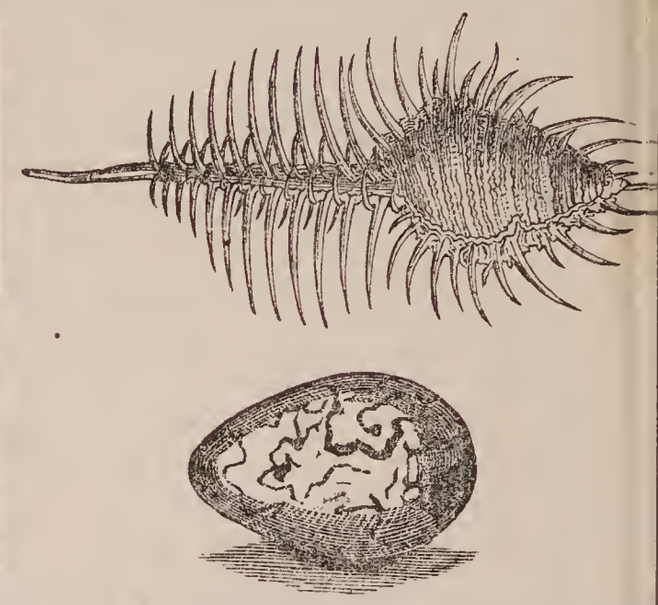

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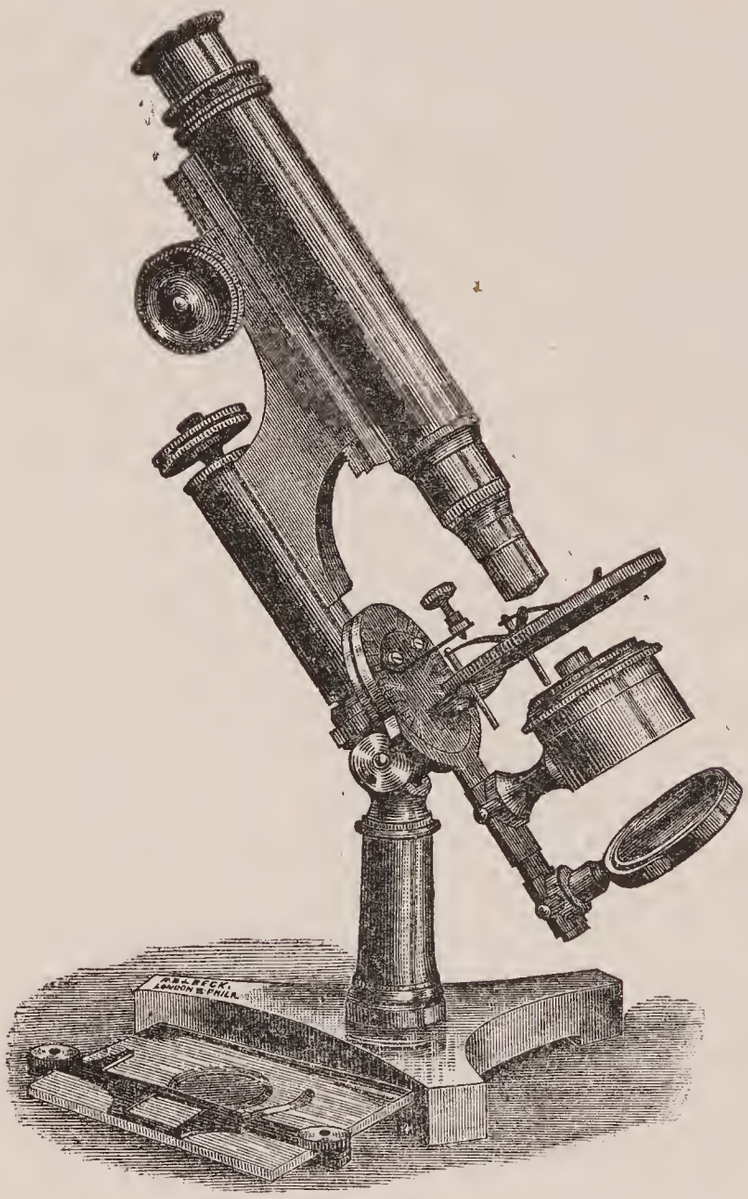

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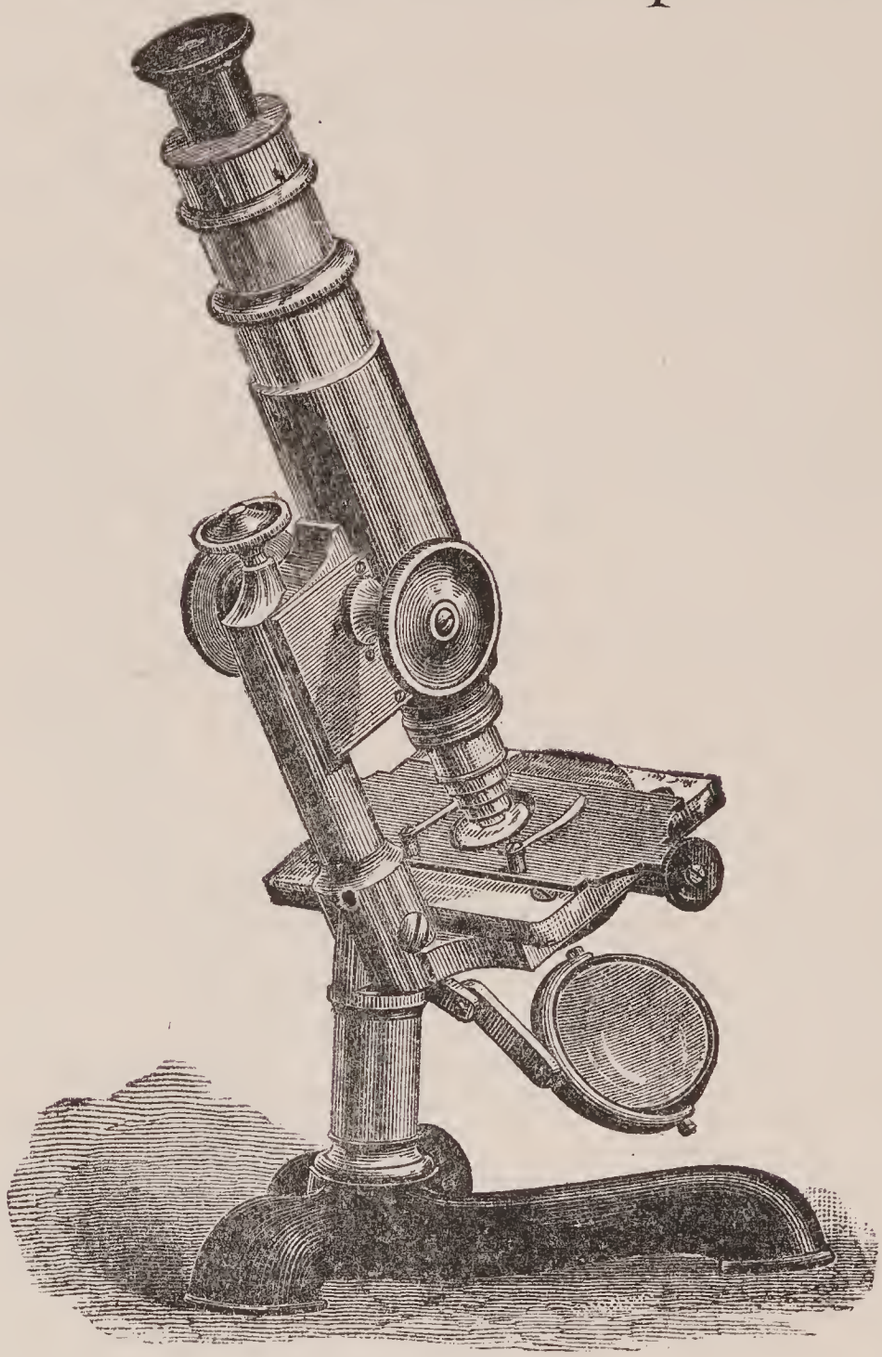

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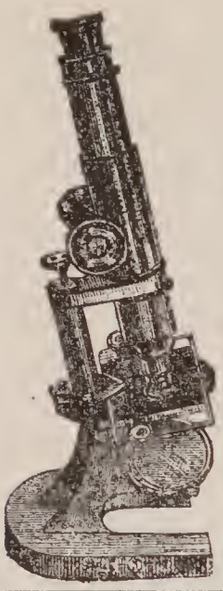

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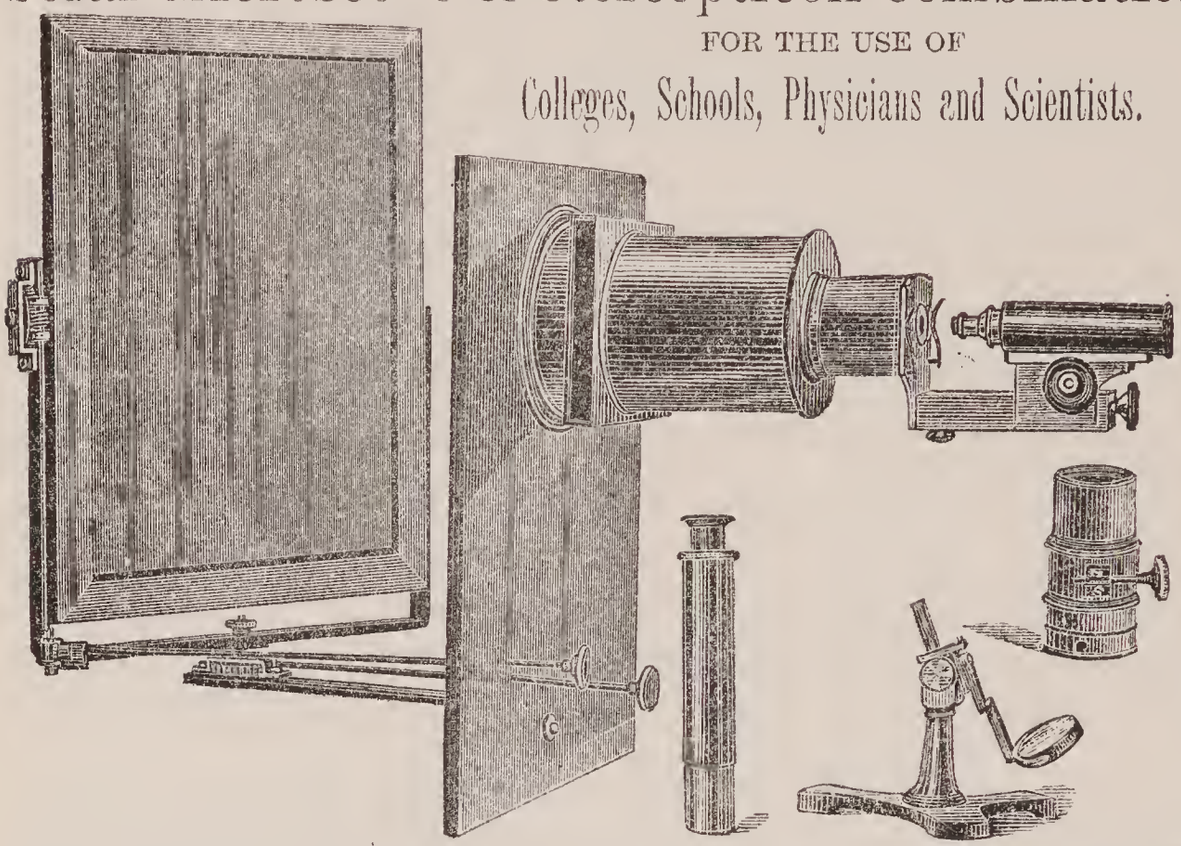

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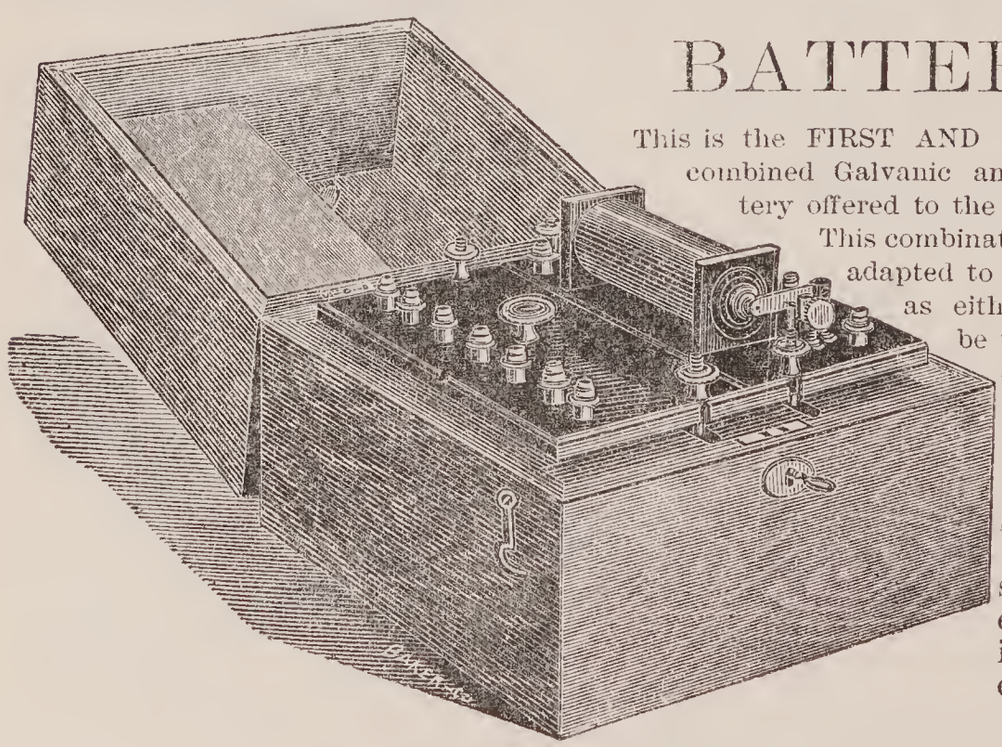

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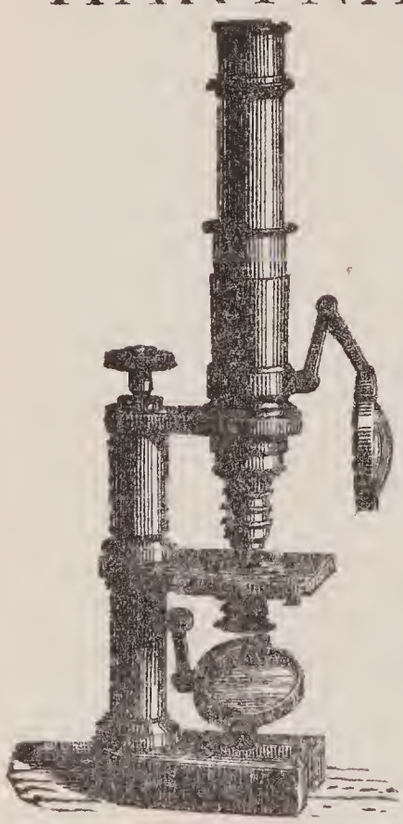

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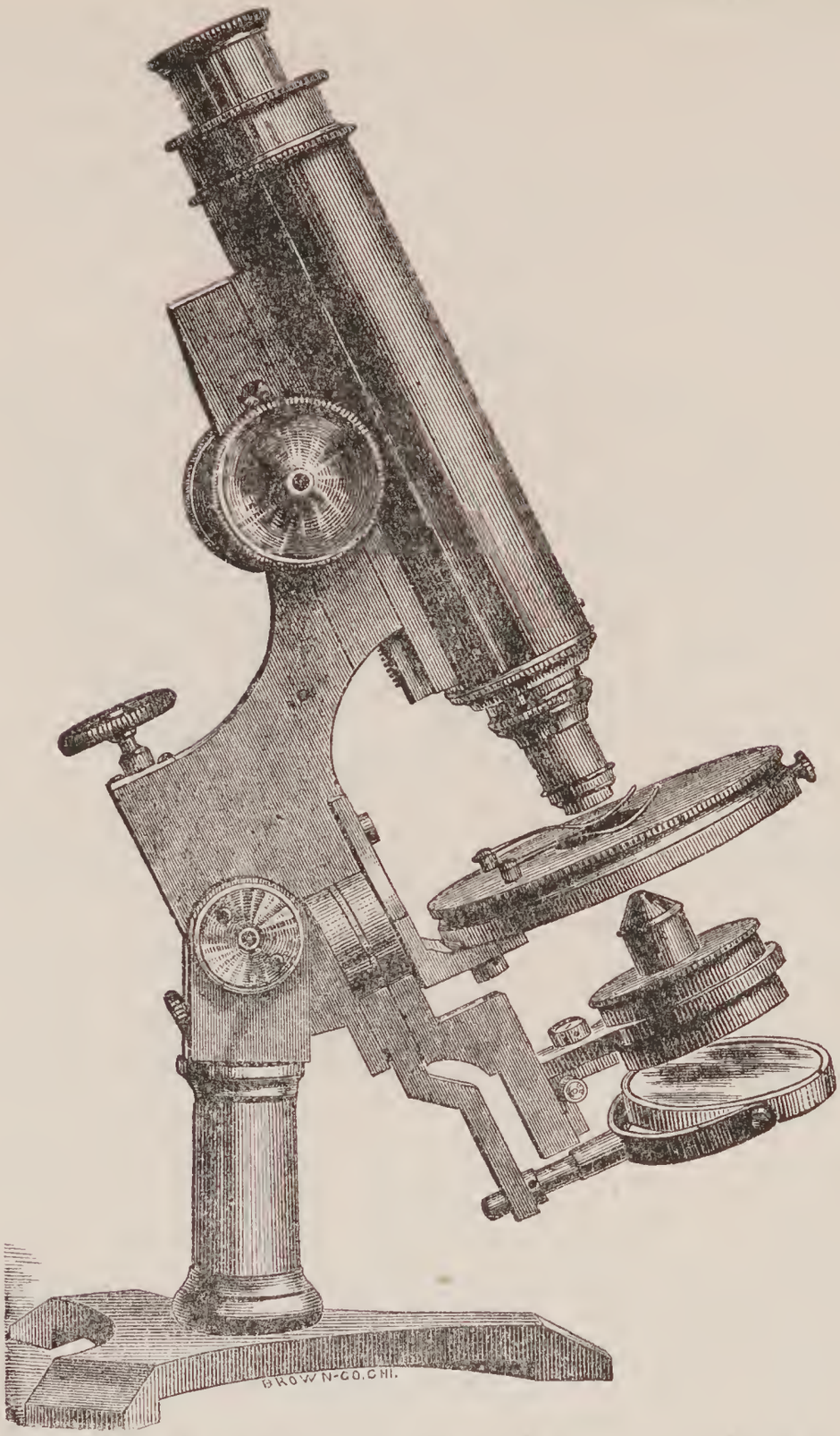

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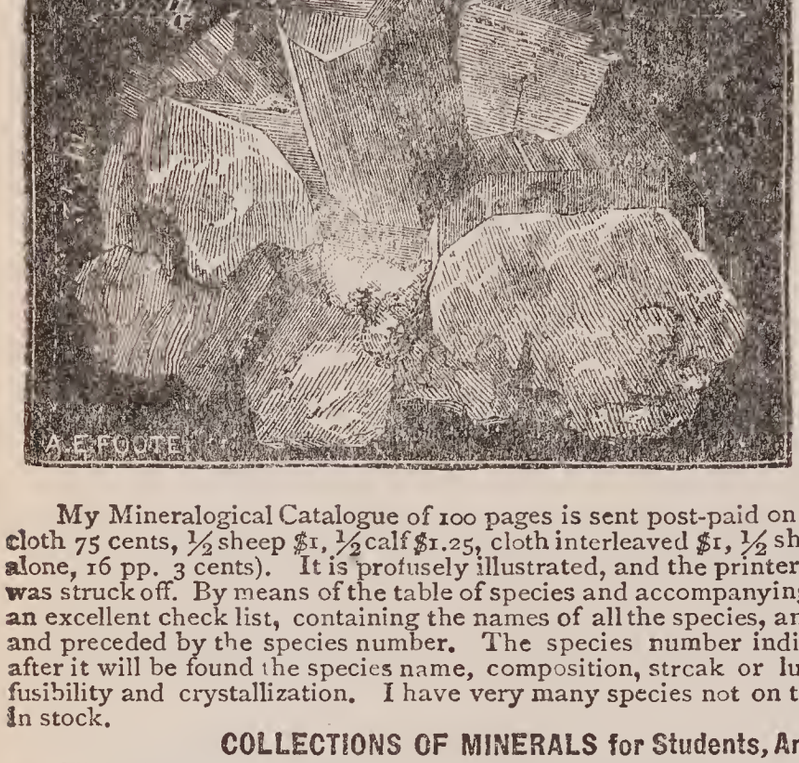

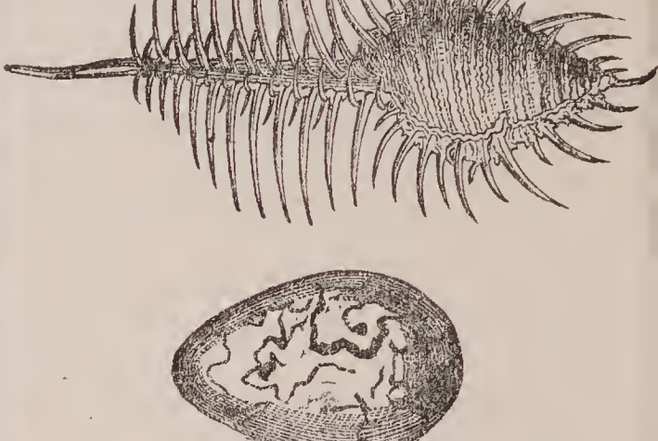

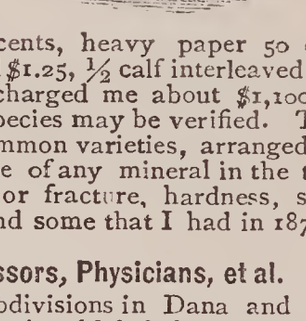

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